DOCUMENT RESUME

ED 437 744 EC 306 753

AUTHOR	McNulty, Tom, Ed.
TITLE	Information Technology and Disabilities, 1995.
INSTITUTION	TLT Group, Washington, DC.
PUB DATE	1995-00-00
NOTE	134p.; This is an electronic journal, published only in electronic form by Equal Access to Software and Information (EASI), a project of the TLT group (an affiliate of the American Association for Higher Education). These pages have been downloaded from the EASI Web site at the Rochester Institute of Technology (RIT).
AVAILABLE FROM	For full text: http://www.isc.rit.edu/~easi/itd.html.
PUB TYPE	Collected Works - Serials (022)
JOURNAL CIT	Information Technology and Disabilities; v2 n1-4 1995
EDRS PRICE	MF01/PC06 Plus Postage.
DESCRIPTORS	*Accessibility (for Disabled); *Assistive Devices (for Disabled); Computer Uses in Education; *Disabilities; Educational Technology; Hearing Impairments; Higher Education; *Information Technology; Input Output Devices; *Libraries; Rehabilitation; *Technological Advancement; Visual Impairments

ABSTRACT

Four issues of this newsletter on information technology and disabilities (ITD) contain the following articles: "Developing an Accessible Online Public Access Catalog at the Washington Talking Book and Braille Library" (Charles Hamilton); "Assistive Technology in the Science Laboratory: A Talking Laboratory Work Station for Visually Impaired Science Students" (David Lunney); "Integrating Hypermedia and Assistive Technology: An Overview of Possibilities" (Bob Perkins); "Computer-Assisted Learning and Language-Impaired Children" (Robert Ward); "Audio Description--Seeing Theater with Your Ears" (John Miers); "Technological Access and the Law" (L. Scott Lissner); "Access to GUIs (Graphical User Interfaces): Setting Accessibility Standards for Computer Systems" (Doug Wakefield); "Maintaining Lynx to the Internet for People with Disabilities: A Call to Action" (Richard Seltzer); "Introduction: Information Technology and Access to Libraries: A Special Issue" (Tom McNulty); "Enhancing Library Service for Patrons with Disabilities through Staff Sensitivity Training and Specialized Bibliographic Instruction" (Marilyn Graubart); "The A-D-A-P-T-A-B-L-E Approach: Planning Accessible Libraries" (Alan Cantor); "The Rise of the Graphical User Interface" (Alistair D. N. Edwards); "Universal Access and the ADA (Americans with Disabilities Act): A Disability Access Design Specification for the New UCLA (University of California at Los Angeles) Library On-Line Information System" (Daniel Hilton Chalfen and Sharon E. Farb); "Access to Library Internet Services for Patrons with Disabilities: Pragmatic Considerations for Developers" (Courtney Deines-Jones); "Levelling the Road Ahead: Guidelines for the Creation of WWW Pages Accessible to Blind and Visually Handicapped Users" (Judith M. Dixon); and "Recording for the Blind and Dyslexic: The Development of an Internet Accessible Online Catalog" (Steve Noble). Individual issues also contain news items, reviews, and calls for papers. (DB)

Reproductions supplied by EDRS are the best that can be made
from the original document.

Information Technology and Disabilities

2:1 (January 1995)

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

McNulty

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Copyright Statement

ED 437 744

Articles

1

Developing an Accessible Online Public Access Catalog
at the Washington Talking Book and Braille Library
Charles Hamilton, Public Access Catalog Program Coordinator

Assistive Technology in the Science Laboratory:
A Talking Laboratory Work Station for Visually Impaired Science Students
David Lunney

Department of Chemistry and Science
Institute for the Disabled
East Carolina University
Greenville, NC 27858
chlunney@ecuvm.cis.ecu.edu

Book Review:
The CD-ROM Advantage for Blind Users
Diane Croft, Deborah Kendrick and Albert Gayzagian
National Braille Press
Ann Parsons

akpgsh@rit.edu

Call for Participation:
Workshop on Developing AI Applications for the Disabled
held in conjunction with
The 14th International Joint Conference on Artificial Intelligence

Departments

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Job Accomodations
Joe Lazzaro, Department Editor
lazzaro@bix.com

K-12 Education
Bob Zenhausern, Department Editor
zenhausern@sjuvm.stjohns.edu

Online Information and Networking
Steve Noble, Department Editor
slnobl01@ulkyvm.louisville.edu

Campus Computing
Daniel Hilton-Chalfen, Ph.D., Department Editor
hilton-chalfen@mic.ucla.edu

EC 306753

BEST COPY AVAILABLE

DEVELOPING AN ACCESSIBLE ONLINE PUBLIC ACCESS CATALOG AT THE WASHINGTON TALKING BOOK AND BRAILLE LIBRARY

Charles Hamilton
Public Access Catalog Program Coordinator
December 1993

BACKGROUND SUMMARY

During 1993, the Washington Talking Book and Braille Library (WTBBL), formerly the Washington Library for the Blind and Physically Handicapped, undertook a project to develop an online public access catalog. Patrons can now search all titles in the collection, including old and new titles, and titles produced locally. Access is available seven days a week, 24 hours a day. From the comfort of their homes and at their leisure, patrons can use their personal computers with adaptive output devices to look at all titles by an author or within a particular subject area, or search for a specific title, and then request specific books, or leave other messages for the staff. WTBBL staff members process these requests the next working day, thus bypassing the delay in receiving mail requests. In addition, agencies such as public libraries have access to this online catalog, which enables them to enhance the service currently offered to members of their community.

WTBBL provides a free, state-wide public library service to individuals who cannot read standard print due to a physical disability. As part of the national network of 56 libraries cooperating with the Library of Congress' National Library Service for the Blind and Physically Handicapped (NLS), WTBBL receives books in alternate formats, the special government-issued equipment necessary to play the books, and the latest catalogues. The collection of books provided free by the NLS is similar in content to that found in neighborhood public libraries--classics, best sellers, westerns, mysteries, romances, and a range of non-fiction titles. This free public library service provided by WTBBL is administered by the Seattle Public Library under a contract with the Washington State Library. The funding of this contract is a combination of state and federal funds.

NEEDS ASSESSMENT

The focus of the online public access catalog (OPAC) project was to ameliorate two major problems for patrons: finding specific books and receiving them quickly.

Locating specific books. Because this service is statewide, WTBBL and its patrons are dependent primarily upon the U.S. Postal Service as the medium of communication. Prior to 1993, patrons unable to visit the library could locate books by reading bi-monthly catalogues of new books on tape, in Braille and in large print. These publications and their annual cumulations were the only means of browsing our collection. Back issues of catalogues are not available due to the finite number of catalogues produced annually and a national policy of not reprinting older catalogues.

To locate a title, author or subject of interest, users could pore through their personal collection of catalogues--a time-consuming and laborious process at best--or ask for individual assistance by telephone. There was no way for patrons to search the entire collection by author, title or subject. For this reason, many patrons never selected books at all. Rather, they informed the library of general categories of interest such as mysteries or political biographies and had our computer system issue books at random in these areas of interest.

Receiving books quickly. Prior to the current project, when a patron located a book, it was ordered by phone or mail. Order forms sent by mail result in a one-to four-day delay, as discussed below. Books requested by the patron are sent as part of the selection process used by the automated system.

As technology has become more readily available, more persons with disabilities are using personal computers with adaptive output devices which produce Braille, auditory or large print output. Many of these individuals urged WTBBL to provide online access to its patrons, and the vendor of the automated

circulation system used by WTBBL, developed OPAC software.

To substantiate the informal user comments noted over the years about online access, WTBBL conducted a 1992 survey of its patrons and asked whether they would be interested in direct and up-to-date access to the WTBBL collection. Forty-six percent of those responding indicated that they either presently have a computer or access to one, or that they would be willing to go to a public library which offered computer access to the WTBBL collection.

DESIGNING AND INSTALLING THE SYSTEM

In the spring of 1993, the additional computer hardware needed to operate the online catalog was installed, including additional memory, storage and peripherals for WTBBL's VAX computer. The online catalog software was also installed together with an additional telephone line used specifically for the catalog. The software vendor subsequently wrote a program that transfers additions and changes from the circulation title file to the MARC-formatted OPAC database. It is being run weekly.

One of the advantages of the Data Research software is that it is relatively easy to redesign the screens displayed to users. We have continued to make modifications to the screens to customize the program for WTBBL's needs and in response to patron and staff comments. For example, since almost all OPAC users do not have access to DEC terminals, we have deleted references to special keys found only on those terminals. We have minimized the use of bold and reverse video, since these create extraneous characters for some users who do not have communication software with terminal emulation capability. We have added a number of specialized help screens and have modified the main menu screen to increase the prominence of the option for searching by subject keyword.

Other improvements added recently include an option that allows patrons to find out whether a selected book is on the shelves before they request it. Electronic versions of applications for library service and order forms for magazine subscriptions are also available.

Another useful option included in the OPAC software is a function in which patrons can type "news" and obtain information on any subject the library wishes. We have created a menu system for this function that allows users to view information about the library, about community events, and about the Evergreen Radio Reading Service's schedule.

The library has also established an accessible location in the lobby where patrons may use the OPAC. An accessible computer terminal, equipped with speech synthesis and screen-magnification programs, and with the ability to produce hard copy in large print or Braille, can be used to search the OPAC. This terminal has been popular with patrons and staff.

As of December 1993, the library was in the process of taking advantage of another feature of the OPAC software--the ability to create screens in multiple languages. A library volunteer was in the process of translating the OPAC screens into Spanish, and these were to be added as options for users needing them.

BRINGING THE CATALOG ONLINE

As the project began, we were unsure how much assistance patrons would need in order to use the OPAC. We knew of many library users who were quite computer-literate, but in order to ensure that the system and the instructions were understandable, a draft set of instructions for accessing OPAC was written in May 1994. These instructions were produced in regular print, large print, Braille, and on computer disk, and distributed in June 1994 to a group of 26 testers representing library patrons, libraries, schools and other interested groups. Their feedback was used to draft the final access instructions. These were distributed to cooperating libraries, schools, the press, regional and national organizations, and to the general public in large-print, computer-disk and Braille versions.

The OPAC Program Coordinator provided telephone assistance to many patrons who had questions about connecting to the catalog. In almost every case, we were able to resolve user questions by making

changes to the setup of their communication software and/or the initialization string sent to their modem. The dial-in instructions and a newsletter entitled the OPAC Oracle both discussed some possible remedies if users were unable to connect to the catalog. We have also recruited and trained several extremely talented and knowledgeable volunteers who assist patrons in using the OPAC, as well as conducting searches for those who do not have access to computers. One volunteer is in charge of updating the news function.

PROCESSING REQUESTS AND MESSAGES

Any request received before 4 p. m. is processed at that time. Labels are then computer-generated and printed for mailing the following morning. We have refined the processing system to improve and speed service by:

Processing requests in the afternoon rather than in the morning so that there would be more books available.

Requesting older titles from the NLS multi-state center for direct mailing to patrons.

Producing extra copies of cassette titles requested frequently by students.

Removing titles and formats that are no longer available from the computer.

Clarifying the on-screen instructions for library requests.

Giving patrons the option to receive books immediately as they become available, or more gradually.

MANAGING THE CATALOG PROJECT

The library hired a Program Coordinator to manage the installation, testing, training and publicity needed to make the OPAC a success. Since maintaining the catalog has proven relatively simple, the program coordinator position was eliminated as of December 1993, and its functions were taken over by other library staff members.

Evaluation of this project has been conducted in three ways: through collecting statistical information, through surveys, and through informal observations of users.

STATISTICAL INFORMATION

We received considerably more requests than anticipated: 163 in July, 232 in August, 248 in September, 177 in October, and 195 in November, for a total of 1,015 (as of Nov. 30). We surpassed the 800 messages we expected in late October.

TABLE 1: OPAC STATISTICS, JULY - NOVEMBER 1993

MONTH	# connections	# requests received	# books issued	# books reserved	%issued
Jul	188	163	76	81	46.63%
Aug	203	232	125	93	53.88%
Sep	145	248	104	135	41.94%
Oct	154	177	106	65	59.89%
Nov	160	195	102	89	52.31%
TOTALS	850	1,015	513	463	

TABLE 2: OTHER STATISTICS, JULY - NOVEMBER 1993

NP = Not Patron
NCF = Book requested in format patron does not take
MSC = ordered for patron from another location

MONTH	# other messages	Comments
Jul	5	1 NP, 5 NCF
Aug	2	11 NCF
Sep	1	8 NCF
Oct	1	1 MSC
Nov	4	4 NCF
TOTALS	13	

OPAC requests represent approximately one-half of one percent of the total circulation. It would appear that OPAC has not yet had a significant influence in the library's circulation. It is possible that availability of the OPAC will not affect the library's circulation very much if books requested through the online catalog replace books that would have been sent to patrons through the automatic book-selection process. Use of the OPAC is unlikely to increase patrons' reading speed.

It may also be that patrons are actually reading more of the books that they receive. Patrons may have previously requested more books in the hope that some of them would be of interest. With the ability to select specific books, patrons can be assured of receiving something more of interest to them. Discussions with patrons indicate that many books received through the automatic selection process are not read, but are sent directly back to the library. Naturally, the circulation statistics cannot distinguish between books that are read and those that are not.

USER SURVEY

Although not required under the terms of the grant, the library undertook a survey of those who had requested dial-in instructions. We received 27 completed responses to the survey, which was included in The OPAC Oracle newsletter. Generally, people who have used the system are very pleased with it. Almost everyone liked 24-hour availability and the ability to order books at home. A few have mentioned getting extraneous characters (brought about because their systems do not have VT-100/102 emulation). Patrons consistently mention long-distance charges as a reason for not using the catalog.

Of the 27 respondents, 16 have used OPAC; 11 have not. Those who have not used OPAC listed the following reasons (multiple reasons were permitted):

4 Too expensive
2 No access to computer
1 Trouble connecting
1 Too confusing
5 Other, including "just found out about it," "no modem," "need MORE information," and similar.

Reasons for liking the OPAC included:
16 Available 24 hours
12 Ordering books
9 Easy to use
8 Browsing at home
8 Searching by keyword

8 Ability to check whether a book is on the shelves
7 Receiving books quickly
7 Finding new books
3 Leaving messages for staff

Things respondents don't like about the OPAC:
10 Long-distance charges
3 Difficulty connecting
3 Hard to use
3 Instructions unclear
1 Doesn't work well with my computer and/or adaptive equipment 0 Can't get access to a computer
6 Other, including "hard to browse because of low vision," "hard to look through long search list and see all details," "get lots of garbage characters, very awkward to access" "works OK on home computer but not on office computer"

Six respondents requested a telephone call. The rest did not. The program coordinator spoke to everyone who requested assistance and was able to solve several technical difficulties.

USER COMMENTS

User response to the system has been overwhelmingly positive. Patrons and staff have become avid users within a very short time. Patrons are discovering new ways of using the system practically every day--from searching for favorite authors to looking up complex and obscure subjects. Following are some random excerpts from the comments we have received:

"The online system certainly is an exciting development and I plan to exercise it posthaste. Methinks it'll be fun once again to 'browse the stacks,' so to speak."

"What I like about your new system is that I can browse for hours. I was before limited to outdated catalogs or Talking Book Topics....Now I can look up a new book or special interest book and begin listening to it in two days. Wow! I have used your system over a dozen times! THANK YOU!"

"The ability to know if a book is available online was a great idea and a welcomed addition."

"Thanks for helping out. When I get my SCAN [state long-distance] line installed we will be calling again!!!!!"

"First I would like to thank you for the great service. I've been getting a lot of great books very quickly. The OPAC service has been very helpful and a great source of information. If the budget ever allows it would be nice if you had a 1-800 or Tacoma line for OPAC users...."

"I would like to...remark what a great service you are providing and you are doing a great job. Again, the service [is] incredible. It's amazing how fast you react to requests. I really like the OPAC computer system. If possible, please consider getting a 1-800 WATS line. Thank you."

CONCLUSIONS

Based on statistics, the user survey and informal comments, the library believes that this project has been overwhelmingly successful. The OPAC is a necessary addition to our services, and it allows the library to improve its service to patrons. The central focus of this project was to help patrons locate books in the library's collection, and, having found them, to receive them more quickly.

Locating books. Users are certainly taking advantage of the OPAC to locate books. A larger number of requests has been received than was anticipated. Patrons are able to search the entire WTBBL catalog for the first time, at home, through local libraries and other agencies, and at the WTBBL facility in Seattle. In addition, the OPAC has allowed users and staff to conduct sophisticated searches. Bibliographies can

be created in response to specific patron requests.

Speeding availability of books. OPAC users have bypassed the delivery and processing delays of mail orders. Patrons can receive books on the shelves several days more quickly than was possible before the project.

The title file is being updated and additional copies are being obtained when possible. It is our intention to take all feasible steps to improve the percentage of requested books available.

ADDITIONAL CONCLUSIONS

Hardware. With few exceptions, the hardware needed to operate the OPAC has worked flawlessly. The additional memory, disk drive and server have developed no problems.

We had some difficulty setting up the modem to be used with the OPAC, although it now works fine. We had been told (erroneously, it turns out) that our hardware would communicate only through DEC brand modems. The modem we purchased had to be replaced three times due to hardware failures. The current modem has worked without difficulty for several months, and we have purchased another (of a different brand) for backup purposes. In addition, the library's VAX computer uses slightly different communication protocols than those commonly used by PCs and modems. We were able to create a successful setup, both with the DEC modem and with the Hayes-compatible backup modem. For patrons using modem speeds of 2400 bps or less, the unusual setup is not noticeable. Those with high-speed modems are obliged to turn off error correction in order to connect successfully. Another minor problem: the VAX does not hang up immediately upon logoff, which can cause 5-7 seconds of "garbage characters" to display in some communication software packages.

Software and vendor support. While we have been generally satisfied with the products and service that Data Research has provided, the OPAC system is somewhat limited, as it is one module in a new circulation system they are writing. WTBBL's other circulation functions (including the automatic circulation features unique to libraries for blind people) are still being handled by the vendor's old LBPH software. Until such time as the new software is written (and the libraries involved can afford to purchase it), the OPAC will not be completely integrated into the circulation system. This lack of integration means that while patrons can find out whether books are on the shelves, they cannot view their own histories (what books they have had, what books they have on reserve, and so on), and when they order books, these orders must be manually entered into the circulation system.

The only (very small) bug we have confirmed in the OPAC program has been fixed by Data Research. Book numbers consisting of three letters and five numbers did not display correctly on the holdings screen. As this is being written, we are tracking down a possible bug that precludes records in the circulation database from being transferred into OPAC in some cases, apparently when author information was entered incorrectly.

While the basic OPAC program is very customizable, some of the subsidiary programs OPAC uses are not. We have been unable to modify screens in the keyword program. Although the keyword function works well, its command structure is very different from the OPAC and its menu and help screens are less than clear. In addition, patrons cannot use the book request function from keyword, meaning that anyone who finds a book in keyword must remember author, title or book number and return to the main OPAC program to place the book request there.

Since, as mentioned above, patron book requests cannot be entered automatically into the library circulation system, we have been using a Data Research program that creates electronic mail including book information as well as the patron's name, phone number and so on. While this program can be edited to a limited extent, we have been unable to modify it so that it will show the book number requested by the patron. This requires the staff member processing requests to search for books by author or title before the book can be issued or placed on reserve.

It should be reemphasized that these problems have been very minor, and do not adversely affect the

daily operation of the catalog.

FUTURE OF THE OPAC

Maintaining the catalog will be relatively easy. Changes to catalog entries are updated automatically on a weekly basis. The reader advisory staff has taken over processing of book requests and messages received through the OPAC. Volunteers are updating news items and assisting individuals wishing to use the system. All activities related to the online catalog will be continued using local funds.

Return to itdv02n1 Contents Page

Return to Journal Volumes Page

ASSISTIVE TECHNOLOGY IN THE SCIENCE LABORATORY: A TALKING LABORATORY WORK STATION FOR VISUALLY IMPAIRED SCIENCE STUDENTS

David Lunney
Department of Chemistry and
Science Institute for the Disabled
East Carolina University
Greenville, NC 27858
internet: chlunney@ecuvm.cis.ecu.edu

Much assistive technology for people with disabilities has been developed in the last ten years or so, but the developers of such technology usually quit as soon as they have provided access to computers. But to chemists, physicists, and engineers, that seems to be only half the job: computers are great laboratory tools, and if you connect a suitably adapted computer to instruments and sensors in a laboratory and provide it with suitable data acquisition and data analysis software, you have a great way to make careers in science and engineering more accessible to people with disabilities.

Robert C. Morrison and I first became interested in the problems of disabled students in the laboratory in 1977, when Richard V. Hartness, a blind chemistry student, brought them to our attention. We decided to use high technology to develop a flexible, microcomputer-based aid that could give visually impaired college science students independent access to accurate measurements performed with scientific instruments. Our research group's efforts (which were funded by the U. S. Department of Education) culminated in a luggable, 42-pound, talking, whistling, industrial-strength data acquisition computer that cost $8000 a copy and was custom-built from expensive industrial modules. The group had written about 300 pages of FORTRAN software for the machine, and it could help a visually impaired chemistry student to perform many instrumental measurements with maximum independence. It was an impressive machine, but I couldn't find any company that was willing to build it. I was sure that we had designed a great tool for visually impaired chemistry students, but the prevailing political climate was not receptive to expensive high tech adaptations for disabled students. Also, we were just too far ahead of widely available technology. (This was in the mid-eighties.)

The available technology has now finally caught up with us, and it is now possible to replicate most of the functions of our original $8000 machine at much lower cost. For example, IBM has introduced the Personal Science Laboratory (PSL), a versatile, modular data acquisition system designed for performing computer-aided experiments in school laboratories. The PSL communicates with a host computer through a standard serial port, and reads its various sensor probes upon receiving commands from the host. (It has sensors for pH, temperature, light intensity, and distance.) The cost of the PSL is moderate: the price of a

PSL starter kit is about $500. Also, sound cards have now made it possible to produce highly intelligible synthetic speech and all sorts of other noises at quite low cost: for example, the low end Sound Blaster card by Creative Labs has street price of about $75.
We are taking advantage of these new developments to write software intended to make laboratory measurements more accessible to visually impaired students from the middle school through college, using a talking, whistling, musical, large text laboratory work station assembled from widely available, moderately priced components. The work station hardware consists of an IBM-compatible personal computer, IBM's Personal Science Laboratory, a digital multimeter with computer output, a Creative Labs Sound Blaster sound card, and an electronic balance.

The thorough documentation that IBM provides for the PSL has made it possible for us to write our own software for reading the output of the PSL's temperature, light, and pH probes; the readings are spoken by the Sound Blaster. This software is not complete yet, but the core procedures for reading and controlling the PSL have been written, and adding additional features should be straightforward.

With the addition of an electronic balance to the PSL-computer system, we have a lab work station which can enable a visually impaired student to make independent measurements of the basic quantities mass, temperature, pH, and light intensity. With the further addition of a low-cost Radio Shack Micronta digital multimeter (DMM) equipped with a serial port, we also have the ability to measure AC and DC voltages and currents, resistance, frequency, and capacitance.

A separate program for the Micronta DMM (which operates entirely independently of the PSL) gives spoken readings through the Sound Blaster, and displays the readings in very large text on the screen; readings can be stored in a disk file for later analysis. The program announces the meter's ranges as they are changed, and also tells the user if there is an overflow. If the meter in a hazardous range, the Sound Blaster makes obnoxious noises and gives the user a spoken warning.

A DMM module is available for the PSL, but it costs $350 (on top of the cost of the PSL), whereas the Micronta DMM costs only $130. The Sound Blaster-DMM combination at a total cost of about $220 is surely the world's cheapest talking data acquisition system!

We are also developing a versatile data analysis program which uses varying pitches, speech, and large text and graphics to enable visually impaired students to examine experimental data and some important math functions. The use of audible pitches to represent the values of a variable is a very old method, but in the early 1980's our group at East Carolina added a new twist by giving the user the ability to scan or step through the data in either direction, and by having a speech synthesizer speak the

numerical values of the variables upon command. The rising and falling pitches enabled a visually impaired student to locate peaks and other interesting qualitative features in a set of experimental measurements, and the speech output gave quantitative data. The newly revised version of this program runs on an IBM-compatible PC and displays large text and a visual graph in addition to tones and speech. It uses an external speech synthesizer, and runs in conjunction with a screen magnification program which can enlarge graphs and text. (We are now adapting the program to speak through the Sound Blaster sound card.)

The updated data analysis program includes all the features of the original and many important new capabilities. As in the original program, the user can locate peaks and troughs easily because maxima and minima in the data produce maxima and minima in the pitch. The user can scan or step through the data, and can control the scan rate over a wide range.

At any time, typing "x" on the keyboard causes the machine to speak the current value of the independent variable. Similarly, typing "y" produces a spoken value for the dependent variable. To improve auditory resolution, the user can jump the frequency up and down over three octaves to find the frequency range where pitch discrimination is best.

We included visual output in the form of color graphs and large text to accommodate visually impaired students who have usable vision; the progress of the data scan is indicated on the graph by a heavy vertical cursor line. The user can select the display colors to obtain color combinations that give the best visual contrast.

Data for the program can consist of experimental measurements read from a disk file, or user can examine any of a library of common mathematical functions. The library functions now include the six trigonometric functions, common and natural logarithms, exponential functions, and polynomials. The purpose of the library of functions is to give visually impaired students the opportunity to become familiar with the properties of functions that are encountered frequently in science and engineering.

Other features of the program include a help menu, a menu of operations that can be performed on the data, and a math toolbox. The toolbox includes a simple statistical package and tools for the pre-treatment of the data. The operations that can be performed on the data include taking the first derivative, the integral, the absolute value, the reciprocal, and natural or common logs; these operations will enable visually impaired students to examine, for example, semilog or log-log plots of data.

This is a large and complex program (about 4500 lines of Pascal) and it still has some bugs in it. After it is thoroughly debugged and tested we plan to make it available on the networks and to give it the widest possible dissemination. (I would be

delighted to hear from anybody who would be interested in test driving any of our programs.)

The original version of the program was written in FORTRAN by Margaret Cetera Gemperline for auditory analysis of spectra and chromatograms. Rosa McMillan and I translated the functions of Ms. Gemperline's program into Turbo Pascal, adapted it to run on an IBM-compatible PC, and added large text, magnified graphics, and other features. The original program was called the Data Review Program; we call its offspring (naturally) Daughter of Data Review.

The talking lab station was originally conceived primarily for students in middle and high schools, but we have been awarded 3-year grant by the National Science Foundation to write and adapt programs for it intended specifically to make college chemistry labs more accessible to visually impaired students. This software will include programs for performing titrations, infrared and visible spectrometry, gas chromatography, and high-performance liquid chromatography. Margaret Gemperline (author of the original auditory data analysis program) is working on this project as a half-time research associate.

Angelo Morris, a blind graduate student in East Carolina's Department of Rehabilitation Studies, joined the group on February 1, 1994; Mr. Morris is an expert on assistive technology for visually impaired people. He will maintain records on a lending library of adaptive science materials that we are assembling, and will also evaluate our computer programs.

Acknowledgment: This work is supported by grants from the National Science Foundation's Directorate of Education and Human Resources. This article is reproduced by permission from _The Student Advocate_, Volume XII, Number III, April, 1994. (Published by the National Alliance of Blind Students, David Sass, editor.)

Return to itdv02n1 Contents Page

Return to Journal Volumes Page

BOOK REVIEW: THE CD-ROM ADVANTAGE FOR BLIND USERS

by Diane Croft, Deborah Kendrick and Albert Gayzagian
Published by National Braille Press
88 St. Stephen Street
Boston, MA 02115
(617) 266-6160
FAX: (617) 437-0456

Print, Braille, & IBM diskette formats
$11.95 ($3.50 shipping for the print version)

A Review by: Ann Parsons (akpgsh@rit.edu)

"Why should a blind person care about CD-ROMs?" "What equipment do you need to use CD-ROM?" "Are drives expensive, and where do I buy them?" These questions and many more are answered clearly and concisely by The National Braille Press' new reference guide, The CD-ROM Advantage For Blind Users. This handy, one volume, starter manual, presents information about a new and fascinating technology. The pamphlet is meant for blind computer users who just beginning to learn about the enormous advantages of purchasing and using CD-ROM discs.

The authors of this pamphlet explain that CD-ROM technology now makes it possible for hundreds of books, pamphlets, magazines and even multimedia games and education programs to be stored on small, round pieces of plastic. They stress the fact that being able to access this wealth of data will open doors, often closed in the past.

The pamphlet contains three parts. The first part answers 17 questions commonly asked by new users of CD-ROM's. The second section profiles its authors as well as several other individuals and explains how they use CD-ROM technology. The third section has a list of titles of CD's which have been found to be accessible. In the back of the pamphlet is a directory listing sources for accessible CD's, CD-ROM drives and blind or visually impaired people with experience in using CD's.

The first paragraph of this review asked some of the questions addressed in "The CD-ROM Advantage For Blind Users." Here are partial answers to them.

Q: "Why should a blind person care about CD-ROM? CD-ROM is a breakthrough publishing medium for blind people who have never had equal access to standard print publications and, most notably, reference works. Now, for the first time, it is possible for a blind person to have access to dictionaries, encyclopedias, directories, etc., at a relatively low cost, in a small, compact size, and in an output format selected by the user."

Q: "What equipment do you need to use CD-ROM? To use CD-ROM, you must first have a computer. And for a blind person, obviously you need an accessible computer with Braille, speech, or large-print display. Just how powerful your computer must be depends on what you want to do with CD-ROM." This subsection is most interesting because it explains that one need not have the newest and most powerful computer in order to run the simpler sorts of CD's. This kind of realistic approach to the subject of computer hardware is one of the pluses in this pamphlet.

Q: "Are drives expensive, and where can you buy them? The price of an average drive is $300-$500, depending on whether the drive is internal or external, and whether it includes a sound card. Brands like Mitsumi and Panasonic are fairly inexpensive with prices between $200-$250. CD-ROM drives that feature faster average access times can run as high as $1,000. Typically, owners of an IBM or PC-compatible computer must spend $300-$1,000 for a CD-ROM player, a sound card and additional speakers. The overall cost is slightly less for Macintosh users, who only have to add a CD-ROM drive."

The second part of the pamphlet profiles users of CD-ROM's who are blind. Here is a sampling of some

of the ways in which these people use this new technology.

Deborah Kendrick: "In my work as a professional writer and editor, information is critical. I might be researching the combined effects of asthma medications one day and the acting career of Robert Redford the next, and meanwhile be asked to add some statistics to an article on bi-racial adoptions. With CD-ROM technology, I can do all of those things swiftly and independently, at 3 a.m. or 3 p.m.. and I can usually lose time wandering through the fascination of fact-finding as well!"

Paul Henrichsen: "After 20 years of raising kids and working other jobs, Paul Henrichsen and his wife, Yvonne, returned to the college campus together. As graduate students in the MBA program at California State University, Fresno, the Henrichsens decided a few years ago to add a CD-ROM drive to their existing arsenal of home computer equipment.

Today, when small groups are assigned class projects, the Henrichsens invite everyone home, and together they peruse the CD's for material. Titles like Microsoft Small Business Library and Magazine Rack have proved invaluable in such situations, and it's a rare occasion when they need to make that trek to the campus library.

"When I purchased the drive," Henrichsen reflects, "it was with the idea that not only would it be of benefit to me, but that our four children would use it as well. That's exactly what happened, and it's the best investment I ever made."

The third part of this excellent pamphlet is a 20-page list of accessible CD's. Some of these include: American Heritage Dictionary, Deluxe Edition; Britannica's Family Choice; Business Assistant; Colossal Cookbook; Constitution Papers; Desk Top Bookshop; Greatest Books Ever Written; Library of The Future, 3rd Edition; and, Microsoft Bookshelf. The authors state clearly that accessibility is "relative." They explain that CD's for Windows are not accessible to DOS users. In addition, the fact that not all screen readers are alike, and that some of these access CD's better than do others is discussed. Finally, they state that sometimes the experience level of a user plays a part in whether or not a particular CD is accessible. All these statements mean that the authors of this pamphlet were careful to present their material in a straight forward and honest manner.

This is the true advantage of this pamphlet, that it is not biased in any way. It presents facts and it presents sources to provide more knowledge about the subjects discussed. In a world where advertisers promote products in order to gain business, this pamphlet is a refreshing change.

Return to itdv02n1 Contents Page

Return to Journal Volumes Page

CALL FOR PARTICIPATION

WORKSHOP ON DEVELOPING AI APPLICATIONS FOR THE DISABLED HELD IN CONJUNCTION WITH The 14th International Joint Conference on Artificial Intelligence (IJCAI)

TENTATIVE DATE 19 AUGUST 1995

TECHNICAL DESCRIPTION

Our goal in this workshop is to explore the application of AI technologies to help alleviate perceptual, cognitive or motor based challenges routinely faced by many people. In this workshop, we hope to gather together AI researchers working with the disabled, as well as others whose work may be applicable to the special needs of the disabled.

Although there is interest in applying AI techniques to systems that assist disabled people, the area is not yet a well-defined field of application. We expect many of our discussions to be exploratory, and will focus on the following points in particular:

1. Description of AI techniques or methods that have proven useful in designing applications for the disabled.

2. Characterization of applications in which AI techniques are likely to be of significant use.

3. Analyses of novel interfaces that can be used by the disabled.

4. Empirical studies of successes or failures, documenting the effect of AI techniques in designing applications.

5. The applicability of already established work in other related areas (such as robotics, computational linguistics, speech generation, etc) to such applications.

It is clear that there needs to be an understanding of what is needed in the disabled community as well as what is possible with the current AI technology. We are at a point in time when AI technology is advanced enough to make a significant difference in the lives of disabled people. A workshop at this time can identify matches between researchers' work and needs of special populations. Discussions of what has been done, what can be done, and what needs to be done will provide the necessary impetus to help make AI applications for disabled people a viable application area.

ORGANIZING COMMITTEE

Dr. Vibhu O. Mittal (primary contact for workshop)
Learning Research and Development Center
University of Pittsburgh
3939 O'Hara Street
Pittsburgh, PA 15260
Ph: +1 (412) 624-7040 (office)
+1 (412) 362-3165 (home)
+1 (412) 624-9149 (fax)
email: mittal@cs.pitt.edu

Dr. John M. Aronis (co-chair)
Department of Computer Science
University of Pittsburgh
email: aronis@cs.pitt.edu

Dr. Kathleen McCoy
Department of Computer Science
University of Delaware
email: mccoy@cis.udel.edu

Dr. Ephraim Glinert
Department of Computer Science
Rennsealer Polytechnic Institute
email: glinert@cs.rpi.edu

Dr. James Slagle
Department of Computer Science
University of Minnesota
email: slagle@cs.umn.edu

SUBMISSIONS:

Papers may be submitted in either electronic (LaTeX, Postscript, ASCII) or paper form. Electronic submission is prefered. Paper submissions (5 copies) may be sent to:

Dr. Vibhu O. Mittal
Learning Research and Development Center
University of Pittsburgh
3939 O'Hara Street
Pittsburgh, PA 15260
e-mail:mittal@cs.pitt.edu

Papers are limited to 15 pages, each page having no more than 45 lines with 1 inch margins, using 12 point type. Titlepage, abstract, figures, and references are included in the 15 page limit. Submissions must be received by 15 March 1995 for consideration. Electronic submissions are subject to the same page limitations (when printed) as hard copy submissions.

We encourage people with demonstrations or videotapes to contact Dr. Mittal directly.

Depending on the number of people registered, it may also be possible for us to have participants who do not submit a paper. Please contact us for more details.

REGISTRATION:

Please note that you must be registered for the main conference to register for and attend workshops at IJCAI-95. The workshop program for IJCAI-95 is 19-21 August, and the main conference is 21-25 August. Send email to ijcai@aaai.org for registration, travel, and housing information.

Return to itdv02n1 Contents Page

Return to Journal Volumes Page

JOB ACCOMMODATIONS
EDITOR: JOSEPH J. LAZZARO

Welcome to the Job Accommodations department of the Information Technology and Disabilities journal. In this section, we focus on assistive technologies and techniques for disabled people in the job market. Numerous adaptive hardware and software packages make employment easier, and in some cases, possible. We are constantly looking for new resources to be published in these pages. The editor of this department is Joseph J. Lazzaro, director of the Adaptive Technology Program, Massachusetts Commission For The Blind, a vocational rehabilitation program that provides adaptive equipment and technical consultation with the goal of employment for persons with vision impairments. Mr. Lazzaro is a freelance technical writer, with numerous assistive technology-related articles and product reviews in print, including a 250-page guide describing how to adapt PC's for persons with disabilities. "Adaptive Technologies For Learning And Work Environments" is published by the American Library Association, Chicago, 800-545-2433. Mr. Lazzaro can be reached by telephone at 617-727-5550, Ext. 4305, or through the Internet at: Lazzaro@Bix.Com.

TABLE OF CONTENTS

WINDOWS AND GUI UPDATE
OUTSPOKEN FOR WINDOW
JAWS FOR WINDOWS
DECTALK AND SMARTALK PORTABLE VOICE SYNTHESIZERS
AUDIO CASSETTE
TUTORIALS
ALADDIN CCTV
CLEARVIEW CLASSIC CCTV

WINDOWS AND GUI UPDATE

If you're working in an office, you're probably using Microsoft Windows. Windows remains the dominant operating system for today's business computers. This requires persons with disabilities to become familiar with Windows and to become equally skilled with Windows-based adaptive technology. Fortunately for many users with disabilities, Windows is a fairly accessible environment. The Windows Access Pack from Microsoft offers numerous utilities to make Windows more accessible. These include drivers to make moving the mouse easier, a sticky-key program, a program to flash the screen when the computer beeps error messages, and much more. The Access pack for Windows does not include any meaningful utilities to assist blind users, such as a screen magnifyer or speech output package, which is a serious limitation.

Unfortunately, Windows is difficult, if not impossible for blind computer users due to the lack of standardization among applications. Currently, screen readers written to run under Windows are not able to obtain sufficient information from the operating system to work reliably. According to Microsoft, work is proceeding to correct this problem, but several years will undoubtedly pass before the problem is ultimately resolved. In the meantime, the adaptive vendor community must do all it can to create robust and workable screen readers for blind users.

Just over the horizon, the Unix operating system and its graphical user interface may soon boast its own screen enlarger and screen reader. The Disability Access Committee For X is currently involved with creating the hooks necessary to create such assistive technology for Unix applications. It is expected to bear fruit sometime in 1995 or 1996, when it is hoped that a Unix-based screen reader and video enlarger will be available.

OUTSPOKEN FOR WINDOWS

A product of Berkeley Systems of Berkeley California, Outspoken For Windows is a purely Windows-based screen reader for blind computer users. Outspoken can drive about 30 commercial voice synthesizers, including both serial and circuit-card-based units. Braille displays are not yet supported. The Outspoken package comes bundled with a main program disk, tactile screen guides to Windows, and cassette and disk copies of the system documentation. The tactile reference cards allow the user to "feel" what basic Windows screens and menus look like. This is helpful to the novice user who has not yet driven Windows or a graphical user interface. According to the company, Outspoken works with Windows-based word processors, databases, spreadsheets, and other telecommunications packages. Although Outspoken does not claim to make all Windows applications accessible, it offers a robust user interface and solid technical support. Unfortunately, the Windows operating system as a whole does not offer blind users as much accessibility as exists within the text-based MS DOS environment. This is because Windows applications are not currently standardized, which results in inaccurate reading of the screen. Until Microsoft, and its major independent software developers standardize their applications, blind users will not enjoy much success with Windows-based applications.

JAWS FOR WINDOWS

Another Windows-based screen reader to recently enter the market, Jaws For Windows is a product of Henter-Joyce (St. Petersburg Florida). Jaws For Windows can drive many commercial speech synthesizers, and comes with documentation in print, on disk, and on audio cassette. Jaws For Windows is a stand-alone screen reader, and does not require Henter-Joyce's popular Jaws For DOS screen reader to operate. Before the end of 1995, I am confident that several additional Windows-based screen readers will enter the market. According to the grapevine, GW Micro and MicroTalk are both ready to release Windows screen readers in the very near future.

DECTALK AND SMARTALK PORTABLE VOICE SYNTHESIZERS

Speech synthesis remains one of the most powerful and popular adaptive technologies being used on the job. The need for high quality speech is increasing as mainstream applications increasingly rely on speech output. For persons with disabilities, portability is often an important factor. Portable synthesizers are useful for blind consumers using speech to access laptop and notebook computers. Portable speech synthesizers can be taken from the job site, to school, or to the home office for use. High quality portable speech synthesizers make for smaller and lighter communications devices for people with speech impairments. Two new portable speech synthesizers offer different features.

The Dectalk Express is the long-awaited synthesizer from Digital Equipment Corporation (Maynard Massachusetts). Dectalk Express is a portable, battery-powered speech synthesizer with nine individual voices. Similar to the traditional Dectalk synthesizers, the Dectalk Express boasts the clearest and most natural sounding synthesized speech available. Dectalk Express is small enough to fit in a coat pocket and easily interfaces to any standard 9-pin serial port. Dectalk Express can thus be used on desktop, laptop, or notebook computers. The unit contains a built-in speaker and headphone jack for private listening. The unit is sold by many vendors of adaptive hardware and software, and it is widely available.

The Smartalk voice synthesizer is a product of Automated Functions (Arlington Virginia). The synthesizer comes bundled with two interface cables, one for use on a desktop computer, and the other for a laptop. A parallel interface card is included for installing the synthesizer on a desktop computer. This permits the user to dedicate one printer port permanently to the synthesizer. A pair of stereo headphones with volume control is also included. Smartalk automatically turns itself on and off, depending on the state of the desktop or notebook computer. Powered by a single 9-volt cell, the battery is easily replaced. Smartalk has a built-in speaker, making it highly portable. The unit will fit easily in a shirt pocket. Weight is five ounces. The synthesizer is based on the SSI263 speech chip. Smartalk is available from the manufacturer or from a variety of dealers.

AUDIO CASSETTE TUTORIALS

The audio cassette continues to be a robust medium for the provision of information. Numerous

companies offer hardware and software tutorials on a wide variety of subjects, allowing users to learn new skills, or brush up on old ones.

Top Dot Enterprises (Everett Washington 206-335-4894) offers several audio cassette tutorials. "Top DOS 5/6" is an introduction to MS DOS versions 5 and 6. The tutorial comes on three audio tapes and includes a supplementary disk of freeware and shareware programs. The tutorial takes the user from basic keyboarding to advanced features including batch files, macros, disk compression, and hard-disk management. The supplementary disk contains a shareware word processor, telecommunications program, text file reader, sample batch files, and some basic utilities. Top Dot also offers a tutorial for the ASAP screen reader from Microtalk. This tutorial is on two audio cassettes, and has been updated as recently as November 1994. Top Dot also offers the "Complete Audio Guide To The Braille 'N Speak" pocket talking computer. The tutorial covers a range of simple to advanced functions, creating files, printing, interfacing options, and other topics. Top Dot can be contacted via Internet mail at deamar@eskimo.com

ALADDIN CCTV

The price of closed circuit television systems (CCTV) has been decreasing slowly over time, making it possible for more individuals to take advantage of magnification technology on the job. Aladdin is an inexpensive CCTV system for persons with vision impairments. Capable of enlarging books, magazines, and other printed material, the unit is compact and fits easily on the desktop. The reader consists of a 14-inch black and white video display monitor mounted above the camera system. The unit has a variable magnification range of 4 times to 25 times, and can display both standard and reverse images, either black on white, or white on black, allowing the user to view information in the most comfortable mode. The unit comes with a reading table, permitting the user to place reading materials beneath the camera focus. The unit is available from Telesensory Corporation, Mountain View California, or from a variety of dealers.

CLEARVIEW CLASSIC CCTV

Another inexpensive CCTV system for use on the job, the ClearView Classic is a compact CCTV from Humanware, Loomis California. The unit contains a video monitor, reading table and camera, and can magnify up to 37 times. ClearView has only three controls: magnification level, focus, and contrast, making it easy to operate. The unit has a removable base that allows the unit to tilt and swivel for more comfortable reading. The user can choose from a 14-inch monitor with white paper background or a 14-inch monitor with bright white background. A 17-inch monitor can be had for an additional charge.

JOSEPH J. LAZZARO, FREELANCE WRITER
"ADAPTIVE TECHNOLOGIES FOR LEARNING & WORK ENVIRONMENTS"

HOW TO ADAPT COMPUTERS FOR PERSONS WITH DISABILITIES
THE AMERICAN LIBRARY
ASSOCIATION CHICAGO IL USA
ISBN 0-8389-0615-X
PHONE 312-944-6780

Return to itdv02n1 Contents Page

Return to Journal Volumes Page

DEPARTMENT: K - 12

Editorial Staff
K-12 Department

Bob Zenhausern - Anne Pemberton
Executive Editor - Managing Editor

Assistant Editors

Lois Elman - Michael Holtzman - Sheila Rosenberg
Information - Technology - Chatback

There are seven yellow crocuses blooming in my yard. Does that mean that winter is ended? Or does it mean that spring is beginning? A future teacher, studying Chatback as a homework assignment, recently wrote asking why we advocate having special ed students on the nets. "Do they get more out of it than regular students," she asked. Are we living through the last gasps of this old and worn-out century? Or the gay awakenings of the new?

In this issue, I'm sharing a bit of the gay awakenings happening on the World Wide Web, Lois is reporting on a book with a fresh perspective on dyslexia, and Sheila is providing answers for those asking why we are doing this. Behind the scenes, Bob is creating new online environments (a Web page/mailing list project to build a kid-created online encyclopedia), and Tom is evangelizing in Estonia.

Anne Pemberton

K-12 RESOURCES ON THE INTERNET
Bob Zenhausern

The past six months have seen the growth of a host of new resources aimed at the pre-college population and include new papers, Listserv Lists, gophers, and World Wide Web sites.

George Casler has created the New York State Department of Education gopher that contains a K-12 folder which contains a section on Disability Resources and Information.

HREF= gopher://unix5.nysed.gov

Linda Joseph has developed World Link, a newsletter for K-12 as an aid to fining curriculum resources on the Internet.

HREF= gopher://ericir.syr.edu/Journals/World Link Newsletter

Barbara Gollon has created the online KidTECH Newsletter. It will monitor and report on the latest developments in electronic learning and software.

HREF= gopher://sjuvm.stjohns.edu/Educational Resources/KidTECH

Amy Bridgeman has written a paper describing MOOSE-Crossing a text-based virtual world aimed at a constructionist learning culture for children with diverse abilities and cultures.

HREF= ftp://media.mit.edu/pub/asb/papers/moose-crossing-proposal in Post Script, Rich Text Format, and Ascii Text.

VirtEd is a new list that has just been created at St. John's University. It is concerned with the use of virtual reality in education. This ranges from the Gloves and Graphics of immersive virtual reality to the text-based virtual worlds like Diversity University. To subscribe send mail to:

listserv@sjuvm.stjohns.edu with the message: sub virted firstname lastname

Don Soucy has started the EDRES-L (Educational Resources on the Internet) and EDRES-DB (Searchable archives of EDRES-L). For information and subscriptions send mail to listserv@unb.ca with the message: info subscribe edres-l firstname lastname

A search of the EDRES-DB list uncovered only three messages that contained the word disabilities.

CNIDR has developed a series of 33 K-12 oriented lists. For an index of these lists and information on how to subscribe, send mail to listserv@k-12.cnidr.org, with the message: lists info There are no lists devoted to disabilities in the K-12 area.

One of the most recent lists is WWWEduc, a list devoted to the use of World Wide Web in K-12 education. To subscribe to this list, send mail to listserv@k-12.cnidr.org with the message:

subscribe wwweduc firstname lastname

An exciting project that developed from WWWEduc is Kidopedia, an encyclopedia for and by the K-12 Internetters who will be multicultural and multilingual, as well as multimedia. A Listserv has been developed for those interested in the development of Kidopedia and all are invited to join. Send mail to listserv@sjuvm.stjohns.edu with the message: sub kidpedia firstname lastname

Note: There is no letter "o" in Kidpedia (the list) due to the eight- letter limit.

The following note by Anne Pemberton provides a background and tutorial on browsing the Web.

K-12 ON THE WORLD WIDE WEB Anne Pemberton

Open to a page on the World Wide Web, and prepare for an adventure in information access. The first thing you will notice is that certain words or phrases are highlighted on the screen. These words or phrases are links to further information anywhere that information is located on the Internet. The information can be text, graphics, sound, or all of these. The page may be written in paragraph or story form, or it may look like a conventional menu with either numbered or bulleted links. Graphics and sound files are very large and many systems are not yet able to handle them, but for those with all the right bells and whistles, the world is a smorgasbord of exquisite delights, with everything from full color reproductions of Medieval European art to a video byte of last week's birthday party for Amy in Washington state.

The low end of access to the Web uses the client software "Lynx," which is available as shareware and works even with slow modems. Lynx does not support graphics or sound, but it does permit links to other text files, web sites, gopher sites, ftp sites, and telnet sites, and some versions permit links to newsgroups. At the other end, is Mosaic, the higher octave of Lynx that runs only on 9600 baud or faster modem, which supports links to display/play graphics and sound. Adaptive tech users will find the Web easy to negotiate via the arrow keys.

Pioneer efforts are afoot to develop instructional applications for the Web. Kidlink, The Global Schoolhouse, Academy One and other popular online projects are developing Web pages for some of their projects. Chatback has its own Web page, linking to Memories of 1944. In Virginia, the Electronic Academical Village and a small band of daring schools are exploring the possibilities on the web.

The Web is attracting a new breed of user onto the Internet. These new users have taken advantage of classes in how to use the Internet and are ready to put creative energy into new applications within just weeks of their initial access. One such project, currently called Kidopedia, came into existence during a

global brainstorm over the New Year's weekend. Kidopedia will provide an on-going Web project that links children's "encyclopedia-type" Web pages (or even text files) onto an index Web page. The project will encourage collaboration on topics among students in the same and other schools, feedback to the writers of the pages from those who read the work, and will provide a nice showcase for student work on the Web.

Old favorites may shine a new light on the Web. A popular Chatback project, originally designed to last several weeks in the spring of 1992, but which didn't really stop generating mail until the spring of 1994, will be brought back to life, this time on the Web. The Far Star Home Page tells the story of the first expedition with highlighted links to further information, like a copy of the first message, the flag of the first expedition, selected messages, etc. It also has links to details on the star Beth Sharon with perhaps a portion of the star map, and links to details of each of the characters from the expedition. The arrival announcement of the second expedition will be linked here with an easy-to-use mail link so that kids can write to their favorite alien. Live chats between aliens and students will be made easier with a link to the telnet chat address from the Far Star Home Page.

For those who have access to the Web either through Lynx (which is available on Unibase and the rdz.stjohns.edu node) or Mosaic, you can check out my home page and see some of these projects in their current state of construction for yourself. If you use your system from the shell or command mode, use the following:

lynx http://pen.k12.va.us/~apembert

If you access by linking to an opening page, type G)o, and at the prompt for the URL address type:

http://pen.k12.va.us/~apembert

(That funny character before apembert, ~ , is called a tilde and is located in the upper left corner, upper case, next to the number 1, on most keyboards.)

Commands in the Web are easy to remember. When you open to a Web page, use the up and down arrow keys to move from one highlighted word to another, and hit either or the right arrow key to pursue a link. To return to last linked page, hit the left arrow key. The space bar moves from one screen to the next on a long page.

LOIS ELMAN REVIEWS A BOOK ON READING DISABILITY:

The GIFT of Dyslexia: Why Some of the Smartest People Can't Read and how They Can Learn. By Ronald D. Davis with Eldon M. Braum

A review by Lois S. Levine Elman lelman@Potentialities.com

Whoever thought that a condition that makes the learner appear lazy, uninterested, uncooperative and stupid could be viewed as a unique talent?

As an adult with a learning difference, I can testify to the frustrations so commonly experienced by individuals with dyslexia.

When you can master some learning tasks but are totally unsuccessful at others, you don't understand why this is happening to you. Feeling out of control, it is like you're always veering off on some detour and banging up against a brick wall. If you continually experience failure, can you motivate yourself to do it one more time? Being dyslexic is certainly exasperating.

In his book, The GIFT of Dyslexia, Ronald D. Davis presents a view of this condition from a completely different angle. Being dyslexic himself, Mr. Davis incorporated his own experiences and philosophy about the origin of the condition, into a series of remediation techniques that are presented in the book.

After struggling for a half a century with auditory and spatial difficulties that pervade many aspects of my life, it felt so exciting to encounter a positive, written description characterizing the way I know my mind works. It is only recently that I have met other people with learning difficulties who think in pictures, not symbol sounds such as words. Mr. Davis describes this ability as a gift, although it predisposes the individual to a condition which is known as dyslexia.

Although Mr. Davis admits that dyslexics don't develop the same gifts although they do have certain mental functions in common, he cites eight basic abilities that include curiosity, heightened insight and intuition, and the propensity to experience thought as reality. One important gift is the individual's inclination to think and perceive environmental stimuli multi-dimensionally. Given that all the sensory systems are intact, vision seems to be the most frequently favored mode of learning, but the auditory, kinesthetic and tactile modes are important as well.

The book states that individuals with dyslexia are more aware of their environments rather than less aware. This skill enables the individual to think quicker than the average person. Concepts synthesized into pictures can be rotated and viewed from several perspectives which contributes to heightened creativity. According to Mr. Davis, altered perceptions that are applied to the nonverbal solution of a problem are known as intuition, invention or inspiration. When this is done for entertainment, it is called fantasizing or daydreaming. Having an active imagination is one of the results of possessing the ability to pictorially interpret experience.

Mr. Davis claims that part of the art form of thinking in mental pictures is to fill in the blanks when part of the picture is missing. Like a computer program that turns visual still pictures into fluid, animated and rotating sequences, the mind compensates for the lack of full information by inventing the connecting images. The function in the brain that alters and creates perceptions is the primary ability of these individuals.

If they are not forced by a coercive educational system or forceful home environment to adapt to a different way of thinking, people who are dyslexic will develop what Mr. Davis refers to as the gift of mastery. He cites other individuals with dyslexia such as Albert Einstein and Walt Disney who used their creative talents to become masters of their fields.

The underlying message to individuals with dyslexia and to those who are involved in their education is a positive one. Mr. Davis believes that individuals who perceive in pictures, and not in words, are predisposed to developing dyslexia. This condition is not inherent in brain functioning but comes about as a reaction to the feeling of confusion which the individual attempts to remediate by becoming disoriented.It is an inappropriate coping mechanism that feels familiar and comfortable. Unfortunately, this same mechanism causes the individual to experience a lack of success.

Through confusion, the individual adopts compulsive behaviors that reinforce rigid learning behaviors. An example of this is when an individual can't recall the alphabet sequence without singing the alphabet song. Disorientation causes an alteration in the way the individual interpets the task at hand. Being predisposed to easily manipulate and perceive mental images from many different perspectives, the dyslexic person alters what is seen or heard.

The book offers some remediation techniques that Mr. Davis claims have been successful with dyslexic individuals in his workshop. One method involves the use of clay to mold letters into words. Although it is not new to use a tactile method to construct letters, Mr. Davis does lend an ingenious twist to this idea. He identifies those words that present a problem for the individual. Then he works with the individual to construct the word into a three-dimensional picture using clay. The Instructions for using this and other remediation methods are discussed in detail. As a person who has a learning difference and as a parent of an adult daughter who is learning disabled, I find this book upbeat and encouraging. Like going to Lourds in France, everybody is looking for a permanent cure. Nobody wants to feel that a disabling condition is for life. On a personal note, the information in this book reminds me of the way the technique of "patterning" was presented 30 years ago. This method consisted of having disabled child repeat exercises that were supposed to duplicate the activities that other children did normally. Parents of disabled children, were promised that hours of crawling around the floor would train new pathways in

the brain. Some children did benefit from these activities. Who is to say if it was the activity or the attention they received while involved in the process? I guess hope springs eternal.

As a school psychologist, my main discomfort with the book is that it has absolutely no basis in research. There are some pseudo-medical statements that mention the brain, but they are not linked to any citations, so there are no sources for these comments. Mr. Davis puts forth a developmental theory of dyslexia that is inconsistent with the current research on child development. First he says that a three-month-old child is just beginning to recognize facial features. Then he says that the same age child can glimpse his mother's elbow and see a complete mental image of her. The portion of the book describing the development of dyslexia reads like a fairy tale. It is conjecture and not based on any observational data except Mr. Davis' own creative imagination.

Throughout the book, Mr. Davis interchanges the terms "learning disability" and "dyslexia". Although he emphasizes that there are an infinite variety of learning disabilities, he doesn't state how these terms are related to each other. Mr. Davis proposes that attention deficit disorder, with or without hyperactivity, is part of the syndrome of dyslexia. Students who are bored become inattentive or daydream. He states that the impulsive aspect of ADD is most prevalent when the student is confused or uncertain about what to do. Otherwise it is just an attempt to overcome agonizing boredom. He suggests that symptoms such as lack of attention and overt, aimless movement can be remediated in the same way as dyslexia.

In the glossary he defines attention deficit disorder as ADD. The reader is then referred to The Merck Manual of Diagnosis and Therapy. Although Mr. Davis does not define ADD, he clearly distinguishes between attention and concentration. He says, "children who do not have the ability to eliminate confusion develop concentration. Dyslexic children do not develop this ability at an early age because the stimuli for developing it can be eliminated so quickly and easily (through disorientation)."

I found this book interesting but at the same time disturbing because it approached the subject of dyslexia from a home grown point of view. Mr. Davis gives an example that after he made mud letters, he was able to read Treasure Island in a few hours. It is not surprising that his book has some novel ideas. Since Mr. Davis received his professional training in engineering and not in psychology or education, he isn't encumbered by theories of past literature or current trends on the subject.

There are some irresponsible statments in this book that really bother me. I am particularly disturbed by the fact that Mr. Davis claims that "dyslexia is a self-created condition." The assumption is that if you create the condition, you have the power to get rid of it. Since Mr. Davis has no research to support this hypothesis, he may unwittingly be offering false hope to parents and educators. If the remediation exercises don't produce improvement, how is Mr. Davis sure that parents or teachers wouldn't accuse a child receiving the training of not wanting to do better? Would the individual with a learning difference be held accountable for the lack of success of this hypothesis?

In the book, Mr. Davis develops his theory of orientation counseling. Since the individual with dyslexia unconsciously experiences disorientation, there is a need to assist the individual in consciously becoming aware of the process. Mr. Davis talks about "the mind's eye" as a multisensory place that can perceive the world from many angles. Frankly, how this concept relates to orientation counseling and how that method will eliminate dyslexia, is confusing and mysterious.

For all its drawbacks, I recommend at least looking at "The Gift of Dyslexia," which you probably can find in a local book store. I feel its strongest merit is its originality and upbeat attitude. I am also a strong believer in the adage, "if it works, use it". Who knows? Maybe these techniques will benefit you, your child or someone you know. It's worth a shot.

"The Gift of Dyslexia" can be ordered from The Ability Workshop Press, 1601 Old Bayshore Hwy. #260B, Burlingame, CA 94010, Phone: 415-692-8993 and 1-800-897-9001. Fax: 415-692-8997. The suggested retail price is $14.95. Video and audio tapes are available. The Ability Workshop Press intends to publish a newsletter which will further discuss Mr. Davis' techniques. Ron D. Davis can be reached at: .

Sheila Rosenberg presents an update on Chatback.

Chatback USA
Dr. Sheila Rosenberg

A comet hit Jupiter in 1994 and the world woke up to the Internet. It seems that everywhere we have a major shift in our global perspective and our understanding of the implications of the Internet. I continue to speak of the Guttenberg Press but I rarely find that people are asking questions of "which" Internet anymore.

The comet may have hit Jupiter but I am witnessing changes in students who advocate for themselves about curriculum that can be found on the Internet. NASA has provided sensational pictures to share with students around the globe. My dyslexic student moved files for me and gracefully distributed the image onto a network. He has no use for curriculum that is boring or tedious. As a student in the 98th percentile, his connection to the world through the Chatback projects have been a critical feature of his self-actualization and academic growth. He reports that he is at last able to retain the vocabulary that he needs for communication. His classroom teachers, however, continue to strive for routine processes.

Here is where our next revolution for disabled students will lead. As we move forward to new arenas we will need to bring along the idea that the student must be able to advocate for himself.

Equal Access for Software and Information (EASI) is an important group for all interested in developing the K-12 arena. Norm Coombs and I have developed a center for students at Diversity University where students can turn on a robot or check the most recent articles on a gopher slate in a virtual reality environment designed for them. Soon Len Burns and I will be announcing a self-managed visual mode for easier reading in the virtual reality environment.

The Chatback Projects continue to grow in significance to the classroom. So far, we have been looking forward, now let's take a look back at the development of the Memories Project. Through the Memories Project students from around the world have had an opportunity to develop their inquiry skills and hone their understanding of World War II. The project is monitored for maximum benefit and safety to the K-12 student population. The monitoring process is critical to advance understanding as well as comprehension. Educators are asked to join us at Chatback@sjuvm.stjohns.edu to continue the discussion of student needs in projects such as this one.

Global understanding is further advanced with the Kidintro project which helps students learn the fine art of personal introduction of a peer. One never knows the abilities or disabilities of the students being introduced unless it is mentioned. Important relationships have been initiated from this project and you are invited to join this important K-12 project that is monitored by Anne Pemberton. Z-man continues to inspire our students to think and challenge their learning processes.

Whether looking back in time at the memories project or forward in time with Z-Man it is time to develop self-advocacy skills in curriculum development for students with disabilities. We've allowed the mainstream to lead us for too long, when we already have a handle on what will make the difference four our population. Let's go for it!

Return to itdv02n1 Contents Page

Return to Journal Volumes Page

DEPARTMENT:
ONLINE INFORMATION AND NETWORKING

Steve Noble, Recording for the Blind
slnobl01@ulkyvm.louisville.edu

GOPHER NEWS

ALEX

The EASI portion of the St. John's gopher is continuing to expand its disabilities resources. One service added during the summer includes the ability to connect to the Alex catalog system. Alex allows users to browse or specifically search for a text which can then be retrieved over the Internet. Although the current size of the collection is not huge, it is hopefully a sign of things to come in Internet etext services. To connect to the Alex system through St. John's, gopher to sjuvm.stjohns.edu and follow this route:

/Disability and Rehabilitation Resources

/EASI: Equal Access to Software and Information-Main Menu

/EASI's List of Available Internet E-texts and E-journals

/Alex: A Catalogue of Electronic Texts on the Internet

If you have comments and suggestions about the Alex system, you may send mail to Alex@rsl.ox.ac.uk. Be aware that many of the files are very large and may take a considerable amount of time to retrieve. The last count showed a total of more than 700 books and other documents available.

DISCUSSION LISTS

GW-INFO

GW-INFO is an open, unmoderated discussion list featuring discussions relating to GW Micro and other products. Both users and non-users are welcome to join this list. GW Micro products are designed to allow computer access by people who are blind, people with low vision, and people with learning disabilities. They also carry products to assist people with learning disabilities. The Listowner for GW-INFO is Michael Lawler

To subscribe, send email to:

listserv@gwmicro.com

leave the subject line blank, and in the body of the message say:

SUBSCRIBE GW-INFO Yourfirstname Yourlastname

ADVOCACY

ADVOCACY is a discussion list dedicated to addressing the issues of people with disabilities. The goal of the list is to help people with disabilities improve their lives and protect their rights. This list was created to investigate ways to use the Internet to empower people with disabilities. Topics of discussion may include health care reform, employment, civil rights issues, transportation, etc.

To subscribe, send email to:

listserv@sjuvm.stjohns.edu

leave the subject line blank, and in the body of the message say:

SUBSCRIBE ADVOCACY Yourfirstname Yourlastname

From a BITNET node, you may also send the following interactive message:

tell listserv at sjuvm sub advocacy Yourfirstname Yourlastname

UACCESS

UACCESS is a special listserv set up by World Institute on Disability, the Trace Research and Development Center, and the Corporation for Public Broadcasting WGBH National Center on Accessible Media, to facilitate discussion on Universal Access to the National Information Infrastructure. Besides the UACCESS list, there are a number of specialized sub-topic listservs being created as part of the UACCESS project to allow more in-depth working discussions along particular lines without overwhelming individuals with the full volume of discussion across all areas. To find out more information about the sub-topic listservs and to become part of the Universal Access project, you may subscribe to the UACCESS list.

To subscribe, send email to:

listproc@trace.wisc.edu

leave the subject line blank, and in the body of the message say:

SUBSCRIBE UACCESS Yourfirstname Yourlastname

DISABILITY-RESEARCH

DISABILITY-RESEARCH is a new mailbase list intended for those interested in disability research both in the United Kingdom and internationally. It provides a forum for the exchange of ideas, information, and news--particularly among researchers working within a social model of disability.

To subscribe, send email to:

mailbase@mailbase.ac.uk

leave the subject line blank, and in the body of the message say:

JOIN DISABILITY-RESEARCH Yourfirstname Yourlastname

AWD

AWD, the Americans with Disabilities List, is a newly created, moderated forum for discussion related to the Americans with Disabilities Act, the Rehabilitation Act, the Fair Housing Amendments Act, and other laws related to discrimination and disability compliance. Areas of discussion include litigation, pleadings, settlements, verdicts, corporate policies, agency guidance, regulations, statutes and cases.

To subscribe, send email to:

majordomo@counterpoint.com

leave the subject line blank, and in the body of the message say:

SUBSCRIBE AWD your-email-address

CADRE

CADRE is a new listserv set up by members of a non-profit organization of the same name. CADRE is the Coalition Advocating Disability Reform in Education and is made up mostly of students in the post-secondary education arena. The goal of CADRE is to use networking in an effort to make post-secondary education facilities accessible to all.

To subscribe, send email to:

listserv@sjuvm.stjohns.edu

leave the subject line blank, and in the body of the message say:

SUBSCRIBE CADRE Yourfirstname Yourlastname

>From a BITNET node, you may also send the following interactive message:

tell listserv at sjuvm sub cadre Yourfirstname Yourlastname

BLAZIE BBS ON INTERNET

Blazie Engineering, the maker of such products as the Braille 'n Speak, Braille Blazer, Type and Speak, and Braille Lite, is now on the Internet. The Blazie Bulletin Board System serves as a forum for users to discuss aspects of Blazie Engineering's product line, including support, service, and new product information.

To logon to the Blazie BBS, telnet to: **<p> BLAZIE.COM**

and at the Blazie login prompt enter BBS, then also enter BBS at the password prompt to gain access to the system.

Return to itdv02n1 Contents Page

Return to Journal Volumes Page

CAMPUS COMPUTING

DISABILITY-RELATED ACTIVITIES AT A COMPUTER FAIR

Editor: Daniel Hilton-Chalfen, Ph.D.,
University of California, Los Angeles
Danny@UCLA.edu

Guest Contributor:
Sheryl Burgstahler, Ph.D.,
University of Washington
sherylb@cac.washington.edu

For people interested in learning more about adaptive computing technology, there are several outstanding disability and computing conferences to attend. Cal State University, Northridge hosts the largest international, technology and disability conference in the world. This year it is March 14-18 in Los Angeles. Closing the Gap hosts an October conference in Minnesota. Both are long-standing and well-known conferences, and there are newer conferences being established, such as those conferences sponsored by state Tech Act programs.

Invaluable as these conferences are, they are to some extent preaching to the converted. Of equal importance is the presence of adaptive technology activities in "mainstream" computing events. This presents an opportunity to create greater awareness about the potential of this technology and related support services to a much broader audience, one that is typically unfamiliar with the existence of adaptive technology, or even of the great need for it in employment and educational settings. A few past examples of major mainstream computing conferences that have had an adaptive technology component include IT Week in Hong Kong, Comdex, and EDUCOM.

Our guest contributor in this issue, Dr. Sheryl Burgstahler, tells us how a college or university can participate in mainstream computer events by bringing in an adaptive computing component, thereby greatly enriching both the overall event and the lives of those participating. The UW Computer Fair at the University of Washington in Seattle, attracts over 15,000 people annually and is an excellent example of how such a mainstream computing event can also be a showcase for the power of adaptive computing technology.

DISABILITY-RELATED ACTIVITIES AT A COMPUTER FAIR

By Sheryl Burgstahler, Ph.D.,
Assistant Director-Information Systems
Computing & Communications
University of Washington
sherylb@cac.washington.edu

Campuses are looking for ways to support disabled students and to include them in campus activities. Special presentations and programs are sometimes developed to meet their needs. An often overlooked approach is to take an existing event and include disability-related activities that are related to the overall program. A good example of the use of this approach is the 1993 UW Computer Fair at the University of Washington in Seattle.

The UW Computer Fair is the oldest and largest computer show in the Pacific Northwest. It brings together more than 15,000 professionals from the university and the community for presentations and demonstrations of state-of-the-art computer equipment, software, and support materials. "The Electronic Community" was the theme of the 19th annual fair held on March 17-18, 1993. It featured 50 presentations and 160 displays that demonstrate computer and communications technology for business,

scientific, personal, and educational applications. All fair activities were free of charge. Harry Anderson, Macintosh developer and television personality ("Night Court") presented the keynote address, joining a long list of distinguished keynote speakers that includes Steve Jobs and Bill Gates.

Although this event is not focused on disability issues, as the director of the event I make efforts to assure that the event is accessible to individuals with disabilities, publicized to disability-related groups, and includes presentations and demonstrations that deal with use of computers by individuals with disabilities. The ideas shared below may be of use to others who are interested in making an event more accessible and interesting to people with disabilities.

ACCESS

The UW Computer Fair is housed in a facility that is wheelchair accessible. Restrooms and telephones can be used by individuals in wheelchairs and TDDs are available in public areas. Parking for individuals with disabilities is near the entrance of the facility. Braille and large print brochures and Show Guides are available upon request. Sign language interpreters are available and, for disability-related presentations, provided without request.

ACTIVITIES

Each year several disability-related seminars are included in the Computer Fair program. They have included adaptive technology overviews, voice input systems, alternative keyboards, and signage. One of the presentations in the 1993 fair was on an NSF-funded project called DO-IT (Disabilities, Opportunities, Internetworking, and Technology). This project makes extensive use of computers, adaptive technology, and the Internet in its efforts to recruit individuals with disabilities into science, engineering, and mathematics academic programs and careers. A reception followed the talk so that those interested in this topic could continue their casual conversations after the presentation.

DO-IT also sponsored a booth in the exhibition area. Students with disabilities who attend the University of Washington demonstrated adaptive technology to fair attendees. Product and program literature was distributed in regular print, large print, and Braille. One month before the fair, exhibitors were mailed a survey asking if they distributed special products for individuals with disabilities and if they provided documentation in alternative formats. This information was summarized and distributed from the DO-IT booth.

PUBLICITY

Information on disability-related activities and access issues were included in the 70,000 brochures that were mailed to prospective visitors. The Show Guide also included this information. Press releases made special mention of the activities planned for those interested in computer access issues for individuals with disabilities. Mailings of special brochures that highlight disability-related activities at the fair were distributed to mailing lists of special education teachers, disabled students on campus, and support organizations and services. Braille and large print versions were sent to low vision and blind students on campus and to organizations that support individuals with visual impairments.

The presentations and booth were generally filled to maximum capacity, and many participants were disabled themselves. Every year, more individuals with disabilities attend the UW Computer Fair, largely because of the efforts to include activities of special interest to them, efforts to make the event accessible, and widespread publicity. The UW Computer Fair offers an opportunity to participate in an activity of general interest as well as an opportunity to get answers to many disability-related questions. Efforts have also increased the general awareness of the adaptive technology available to help individuals with disabilities attain the maximum possible involvement in academic programs, careers, and other activities.

Return to itdv02n1 Contents Page

Return to Journal Volumes Page

Information Technology and Disabilities

2:2 (May 1995)

Copyright Statement

Articles

Integrating Hypermedia and Assistive Technology: An Overview of Possibilities
Dr. Bob Perkins

University of Charleston, SC
PerkinsR@CofC.edu

Abstract: One of the most useful technologies associated with microcomputers for teachers and caregivers for individuals with disabilities is hypermedia programs. Hypermedia programs allow individuals who do not know how to program a computer using a programming language to create computer software. With a minimum of training, hypermedia programs can be used to create very individualized software. This gives teachers and caregivers the capability to create computer programs such as Computer Aided Instruction (CAI) that will teach the specific objectives that are needed for their classroom. Hypermedia programs can also be used with assistive technologies to compensate for some disabilities. This paper will focus on the possible interaction between hypermedia and assistive input devices. Speech synthesis and hypermedia will also be explored.

Computer-Assisted Learning and Language-Impaired Children
Dr. Robert Ward

University of Huddersfield
Huddersfield HD1 3DH U.K.
r.d.ward@hud.ac.uk

Abstract: This paper first reviews research begun in the 1980s into computer-based remediation for language-impaired children who have difficulties with multiple-word language. The paper then goes on to consider how this work might progress in future. Software was developed to investigate the proposal that computer programs which hold written conversations with their users can be effective in language teaching and remediation. The software is described and studies of the software in use are summarised. Although the software attracted interest at the time and although the studies suggested that the technique could be useful in language remediation, the software never became widely used. Looking back from today's perspective we consider the reasons for this and relate the software to wider issues and trends in computer-based learning (CBL). It is suggested that the approach was never taken up because the software did not fit with how CBL came to be used in schools. This leads to a discussion of how software that simulates written conversation might now progress using today's technology.

Audio Description--Seeing Theater with Your Ears
John Miers, National Institute of Mental Health

JMIERS@AOAMH3.SSW.DHHS.GOV

ICADD (International Committee for Accessible Document Design):
An Introduction and Call for Participation

What is the Internet Public Library, and Why Should I Care?
Sara Ryan

sryan@umich.edu

Departments

Job Accomodations
Joe Lazzaro, Department Editor
lazzaro@world.std.com

Online Information and Networking
Steve Noble, Department Editor
slnobl01@ulkyvm.louisville.edu

Campus Computing
Daniel Hilton-Chalfen, Ph.D., Department Editor
hilton-chalfen@mic.ucla.edu

Return to the EASI Homepage
Return to the ITD Homepage

Last updated 20 June 1996.

INTEGRATING HYPERMEDIA AND ASSISTIVE TECHNOLOGY: AN OVERVIEW OF POSSIBILITIES

Dr. Bob Perkins
University of Charleston, SC
PerkinsR@CofC.edu

Abstract

One of the most useful technologies associated with microcomputers for teachers and caregivers for individuals with disabilities is hypermedia programs. Hypermedia programs allow individuals who do not know how to program a computer using a programming language to create computer software. With a minimum of training, hypermedia programs can be used to create very individualized software. This gives teachers and caregivers the capability to create computer programs such as Computer Aided Instruction (CAI) that will teach the specific objectives that are needed for their classroom. Hypermedia programs can also be used with assistive technologies to compensate for some disabilities. This paper will focus on the possible interaction between hypermedia and assistive input devices. Speech synthesis and hypermedia will also be explored.

Introduction

Because of the uniqueness of individuals with disabilities, obtaining computer programs that help these individuals is difficult, expensive, or impossible. Some situations require software that may not already exist, or if it exists, then it must work with input methods that individuals with disabilities can take advantage of. Assistive input devices already exist and are easily interfaced with computers. Hypermedia programs can put the power of computer programming in the hands of those who can not program, but more importantly, those who need to tailor software for specific individuals with specific needs. Hypermedia files (stacks) can be used to communicate, instruct, or automate other computer tasks to improve access or productivity (Perkins, 1993, 1991). All that is needed is imagination and some computer skills.

The stacks created during this project were as a result of the needs of classroom teachers and caregivers based on their experiences with individuals with disabilities. _HyperCard_, a hypermedia program for the Macintosh was used along with the _TouchWindow_ from Edmark, _Ke:nx_ from Don Johnston, the _Unicorn Board_ from Unicorn Engineering, switches, and _Vocalize XCMD v1.0.2_ (see Appendix). The stacks dealt with communications, cause and effect, eye-hand coordination, finger tracing, scanning, and program launching.

Review of Literature

Hypermedia

Hypermedia programs have gained in popularity since the original release of _HyperCard_ with the Macintosh computer. _HyperCard_ was originally created to be a database program, but has been adopted as a program able to create computer software. Software created by hypermedia programs have been used as tutorials for other software applications, to create interactive videodisc lessons, and even as data base managers. There are currently many different hypermedia programs available, however, each works only on a specific brand of computer (Erickson & Vonk, 1994; Lockard, Abrams & Many, 1994). _HyperCard_, _SuperCard_ and _HyperStudio_ were created for the Macintosh, _LinkWay_ and _Multimedia ToolBook_ were created for IBM compatibles, HyperScreen and _Tutor Tech_ were created for the Apple II series (IIe, IIc, IIgs), and _HyperStudio_ is available for the Apple IIgs. Each of these programs has its own unique features, but the basic concept of stacks with cards is generally the same for all of them.

Files in hypermedia programs are called stacks or books. Each new computer screen is a card or page that has primarily the three following features: text, graphics, and buttons. Text and graphics provide

COMPUTER-ASSISTED LEARNING AND LANGUAGE-IMPAIRED CHILDREN

Dr Robert Ward
School of Computing and Mathematics
e-mail: r.d.ward@hud.ac.uk
University of Huddersfield
Huddersfield HD1 3DH
U.K.

ABSTRACT

This paper first reviews research begun in the 1980s into computer-based remediation for language-impaired children who have difficulties with multiple-word language. The paper then goes on to consider how this work might progress in future. Software was developed to investigate the proposal that computer programs which hold written conversations with their users can be effective in language teaching and remediation. The software is described and studies of the software in use are summarised.

Although the software attracted interest at the time and although the studies suggested that the technique could be useful in language remediation, the software never became widely used. Looking back from today's perspective we consider the reasons for this and relate the software to wider issues and trends in computer-based learning (CBL). It is suggested that the approach was never taken up because the software did not fit with how CBL came to be used in schools. This leads to a discussion of how software that simulates written conversation might now progress using today's technology.

CHILDREN WITH IMPAIRED LANGUAGE

Children who are unable to interact with others through spoken language in the normal way have difficulty in developing satisfactory language skills. For most of us, spoken language is an interactive medium with an accessible structure. As children we construct hypotheses about language and test them by observing the effects of our attempts at speech on others. We are able construct our own understanding of language from the feedback and information we receive.

Children whose interaction with others through language is restricted cannot easily construct understanding in this way. For example, children with impaired hearing, especially those who at age 2 have a hearing loss of 60dB ASA or greater, have to rely on vision rather than hearing as their primary means of communication. These children have difficulty with language because they hear only loud sounds, and then only as vibrations rather than as tonal patterns. Children with brain injury affecting the expression or comprehension of language may show a serious delay in language development often referred to as specific developmental language disorder or dysphasia. Children who are deprived of adequate social contact may have language difficulties. Others with impaired language include those with learning difficulties and those said to be autistic.

Within all of these diagnostic categories there exists a group of children who show delayed or disordered development of language (despite in many cases having otherwise average or above-average levels of non-verbal abilities). It has often been proposed that for the purpose of language remediation no distinction need be made between the different diagnostic categories: that the main emphasis should be upon the remediation of language and language-related skills (Dockrell and McShane, 1993, Chapter 3). We adopt this view in the work reported here.

One distinction we do need to make is concerned with levels of language impairment, which vary considerably. Some language-impaired children show delay in developing language but subsequently recover. Others have a complete absence of language. In between there are many children who begin to develop language but show prolonged difficulties into and beyond their school years. One common hurdle occurs during the development of multiple word sentences, after the emergence of the single

words. This is the group of language-impaired children we are most concerned with here: children who have difficulties in developing multiple word language.

Examples of multiple word language difficulties are clearly seen in the syntactic difficulties of hearing-impaired children and in the slow development of longer utterances in children with dysphasia or severe learning difficulties. The following examples are illustrative. For a fuller account see Bryen (1982), Conrad (1979), Leonard (1989), Quigley and Paul (1984), Wiig and Semel (1976).

Observed omissions of noun phrases, possessive inflexion, article or preposition in the utterances of children with learning difficulties:-

```
"Ran down the street"          "It is Mary dress"
"I want apple"                 "I wanna go this game"
```

Observed errors in question formation or verb processes in deaf children's writing:-

```
"Who the boy saw the girl?"    "The kitten is black?" (question)
"Tom has pushing the wagon"    "The boy is a shirt"
```

Deaf children's misinterpretations or various clauses:-

```
Sentence:       The boy was helped by the girl.
Interpretation: The boy helped the girl.

Sentence:       The boy learned the ball broke the window.
Interpretation: The boy learned the ball.
```

We should not assume from these examples that difficulties are confined simply to the formation and understanding of single sentences taken out of context. Difficulties also occur at both the sub-sentence level, for example in size of vocabulary and in understanding terms for spatial, temporal and kinship relationships, and at the super-sentence level, for example in conversational conventions for initiating and maintaining interaction and in making the inferences necessary for contextual bridging between sentences in narratives.

LANGUAGE REMEDIATION

Approaches to language remediation can be divided into structured and natural approaches. Structured approaches, such as behaviour modification and programmed instruction, are analytical in that they explicitly address issues such as grammar and syntax. An example would be remedial materials organised into structured sets of noun-verb, preposition-noun and determiner-adjective noun phrases. Whilst this has its place and led to some interesting ideas in computer-based language remediation (e.g. Sewell et al, 1979; Bates et. al 1981), it is often criticised for its passive stylised exercises in which language is subject matter rather than tool. Natural approaches, on the other hand, expose learners to situations in which language is used purposefully as a tool. They aim to involve learners in interaction through whatever language they posses, say through conversational activities with teachers or therapists. The remedial materials may still be organised in some way, say according to developmental sequence, but the emphasis is on what language does rather than how it is structured. One programme of remediation based on the Reynell scheme (Cooper, Moodley and Reynell, 1978) involves children in playing with real-life objects, using language such as "Put the spoon in the box" and "Show me the longest pencil". These activities resemble mother-infant games such as those observed by Bruner (1983), which he believes to be very important in early language development. Natural approaches are claimed to reflect the way language is normally acquired.

Whilst both structured and natural approaches have their place in language remediation, it should be apparent that natural approaches can make excessive demands on teachers' and therapists' time. One solution, one that is highly desirable, is to involve others such as siblings and parents in remedial activities. Another possibility is to provide computer-based support.

Around 1982 we began investigating how computers might support natural approaches to language remediation. The main requirement was for software that could interact with its users through meaningful language. The obvious difficulty in this was that, for all intents and purposes, computers could interact only through written and not spoken language, and this remains true today. This seems to imply that computers can be of little help in natural approaches to language remediation which are mainly reliant upon spoken language. However, this turns out to be a much less serious difficulty than it at first appears, and in some ways it is a definite advantage. Firstly, many language-impaired children, especially those with impaired hearing or auditory processing problems, find language more accessible in its written than in its spoken form. Secondly, written dialogue with a computer can have an interactive quality normally absent from other forms of written language, with the immediacy of feedback normally present only in spoken language. Thirdly, the pace of interaction can be slower than in spoken language, allowing time for thought and reflection. Finally human-computer dialogues are not ephemeral like spoken language: a record of what has been said is open to inspection. For some children these factors make written dialogue with computers a highly supportive environment for learning about language.

LANGUAGE-UNDERSTANDING SOFTWARE

The preceding discussion supports the proposal that computer programs that simulate written conversation could be effective in language teaching and remediation. This idea was put forward by a number of computer-based learning researchers in the 1970s and early 1980s. For some it followed from seeing computer-based adventure games and other items of software that supported limited dialogue. For others the idea followed from early AI research into natural language understanding such as Weizenbaum's (1966) ELIZA program and Winograd's (1972) influential SHRDLU program. ELIZA simulated a psycholtherapist (e.g. User: "I feel so depressed"; ELIZA: "How long have you been feeling depressed?") by means of a computational trick. SHRDLU used artificial intelligence techniques to hold a discussion about a "blocks world" (e.g. User: "Find a block which is taller than the one you are holding and put it in the box". SHRDLU "OK".). According to Winograd, SHRDLU could handle complex language such as "Pick up anything green, at least three of the blocks, and either a box or a sphere which is bigger than any brick on the table". But irrespective of linguistic complexity, all these programs used language as the currency of interaction rather than as its subject matter.

In beginning to investigate how computers might support natural approaches to language remediation we devised several SHRDLU-like programs that allowed children to exchange limited, written English dialogue with a computer. It should be made clear at the outset that these programs were by no means as sophisticated as SHRDLU. Our aim was to investigate an approach to language remediation, not to conduct research into artificial intelligence. Our software was written in BASIC and ran on Tandy TRS-80 and later on BBC model B machines with 32K RAM. It was important we used the machines available in British schools in order to be able to collect data in classroom settings. Although this hardware was limited it did not create any major difficulties.

In the software we developed, the subject of dialogue was screen graphics. Each program presented a different graphic environment. One of the simplest programs was concerned with the relative positions of just two objects, a square and a cross. The square could be over, under, to the left of or to the right of the cross. Another simple program displayed three objects, a triangle, a square and a diamond, each of which could independently be coloured red, blue or green. These programs had vocabularies of around 10 words or phrases, allowing around 40 "acceptable" sentences to be constructed by the user. Other programs possessed more complex screen environments and greater vocabularies. One held a dialogue about the numbers, shapes and colours of up to 30 objects displayed on the screen, and had a vocabulary of 32 words or phrases allowing over 3,000 different "acceptable" sentences to be constructed. Programs also varied in cognitive complexity. One discussed the relative lengths of six lines, three of which were labelled "my lines" (indicating that they "belonged" to the computer) and three were labelled "your lines" (indicating that they "belonged" to the user). In dialogue with this program the normal reversal rules for possessive pronouns applied, thus the lines labelled and referred to as "Your lines" by the computer had to be referred to as "My lines" by the user, and those labelled and referred to as "My lines" by the computer had to be referred to as "Your lines" by the user.

The following examples of dialogue should make this clearer.

```
Program:    SQUARE AND CROSS
User:       Put the cross to the left of the square.
(The computer does this)
Computer:   My turn.
            Where is the square?
User:       To the right of the cross.
Computer:   Well done.

Program:    COLOURS
Computer:   What colour is the triangle?
User:       Is the triangle red?
Computer:   Yes.
            Well done.
            Your turn.
User:       What is blue?
Computer:   The square is blue.
            My turn.
            I will colour the diamond green.
(The computer does this)
```

Program: SHAPES

```
User:       Give me twenty one shapes.
(The computer does this, filling the first 21 available positions
with objects of random colour and shape)
Computer:   My turn.
            Do you have four blue shapes?
User:       No, I have five.
Computer:   Well done.
(The computer highlights the 5 blue shapes)

Program:    LINES
Computer:   Is my blue line longer than your green line?
User:       No, my green line is longer.
Computer:   Well done.
            Your turn.
User:       What is shorter than my red line?
Computer    My red line, my blue line and your green line.
```

It can be seen from the examples above that dialogues could include statements, instructions, questions and answers, either as complete sentences or as elliptical answers to questions. Also, exchanges could be initiated either by the user or the computer.

Input was constructed word-by-word or phrase-by-phrase using units of language marked out on paper overlays to a peripheral, A4-sized, touch-sensitive pad known as a Concept Keyboard. This conveniently precluded attempts to use vocabulary unknown to the programs. However its main purpose was to help focus users' attention upon language rather than typing or spelling. Input was parsed using finite state grammars defined for each program.

The software provided feedback about inputs it was unable to recognise. For syntactically unacceptable inputs the software highlighted the erroneous part of the input and provided short explanatory messages about simple omissions, insertions, substitutions and transpositions, for example "PUT ... GREEN: word missing?", "TO OVER: extra word?". In response to other errors the software provided specific messages. For example, if the user attempted to give an impossible instruction the message "You cannot do that" would appear, or where possible a more exact message such as "You have too few yellow diamonds". If the user answered a question about the red box with a statement about the blue box the computer would respond "I asked about the red box".

EVALUATIONS OF THE SOFTWARE IN USE

Two main studies were carried out using 12 items of software. The first study involved a group of six profoundly deaf teenagers with a mean chronological age of 14 years 2 months and a mean reading age of 7 years 1 month, attending a special unit for the hearing-impaired within a mainstream school. These children used the software for one school term, a period of approximately three months. Before and after this period they took part in a referential communication task administered as a pre- and post-test. The referential communication task was not computer-based, but was text-based and used similar language and concepts to that of the software. Subjects' language in the pre- and post-tests was scored for syntax errors, which gave the following results:

	Total number of errors		No. different types of error	
Subject	Pretest	Posttest	Pretest	Posttest
1	8	0	3	0
2	29	7	6	3
3	20	23	3	7
4	17	9	4	2
5	13	9	2	2
6	11	5	6	3
Totals	98	53	27	16

Subjects therefore made fewer syntax errors in the posttest both in number and in type, suggesting improvements in subjects' abilities to construct syntactically acceptable sentences within the domain of language covered by the software. The nature of the errors made was similar to those observed by Conrad, Quigley and their colleagues cited above.

The referential communication task involved subjects in working out the relative positions of objects placed in a grid. In the posttest subjects achieved this task using fewer sentences (in total 12 redundant sentences in the posttest as opposed to 28 in the pretest), which suggests there were improvements in subjects' abilities to use language purposefully.

The above is merely a summary of the findings. The study is reported in detail in Ward et al (1985).

The subjects of the second study were nine 10 to 13 year-olds with a mean language age of 6 years 8 months attending a residential school for speech and language impaired children. The language difficulties of this second group were associated with a variety of conditions including problems with receptive language, problems with expressive language, problems with comprehension suggesting cognitive deficiency and severe language delay caused by environmental factors. This study produced similar findings and is reported in detail in Ward (1988).

Although these studies strongly suggest that written dialogue with computers could be a powerful remedial technique worthy of further investigation, one must be careful not to read anything more into the results. The purpose of the studies was to investigate the potential of a possible new technique in language remediation. They indicate that the software can be an effective way of motivating children to work with language.

Methodological concerns such as problems with single group pretest-posttest designs and the meaning of statistical significance in small groups of subjects are therefore seen as a side issue. The studies were not intended to test beyond question whether subjects made significant gains in their language skills. Such an unequivocal demonstration of language gains would only be useful in the context of a larger corpus of computer-based learning software covering a wider subset of language than the 12 programs used here. Questions of generalisability and persistence of learning would also need to be addressed, especially the extent to which the language learned became incorporated into everyday speech. In fact when these issues are considered, it is very difficult to demonstrate the value of any kind of remediation at all Dockrell and McShane (1993). The studies summarised above suggest that it would be worth developing software to cover a wider subset of language, and only then to evaluate its benefits more thoroughly.

However, before leaving the studies it is of interest to argue through the methodological concerns at least briefly. Single group pretest-posttest designs are common in studies in naturalistic settings and also in recent thinking about the evaluation of computer-based learning software. In practice it is almost impossible to construct satisfactory control groups because large homogeneous groups of language-impaired children within one school do not (thankfully) exist, and even if they did there would be ethical and practical difficulties in denying the control group access to the software. But in any case, the sources cited in the first section of this paper show that without intervention most language-impaired children aged above 10 years will not make any measurable gains over a three or four month period. Thus the single group design is not as problematic as it might at first appear. One other difficulty, that any gains observed in the posttest were a result of experiences in the pretest, also has little weight in this context. It is difficult enough to produce any lasting gains at all, whatever the remediation, let alone gains resulting from a fifteen-minute pretest that persist and are measurable several months later.

WHY THE APPROACH WAS FORGOTTEN

Although the software created considerable interest at the time, only two of the programs were published and the technique was soon forgotten. Looking back from a distance of almost a decade we can now understand some of the reasons why this happened and can consider how the project related to issues and trends in the wider, general progress of computer-based learning.

There are probably two main reasons why the approach was never taken up by others. One is that technology moved rapidly on and the software began to look elementary. This will be addressed under the next heading. The other reason, the one that is the most important and fundamental, is that the software simply did not match the way teachers came to use educational software in the classroom.

If we look back at CBL software developed during the 1980s as microcomputers started to become widely available in schools, we find that the category of software that has had the most lasting success is that which supports rather than directs children's learning experiences. Teachers have come to prefer software that encourages work away from the computer, especially working in groups, in which the computer plays a supporting rather than a central role in the learning environment.

Teachers' preferences are illustrated by the software recommended to teachers and therapists by the British National Council for Educational Technology (McKeown 1991; NCET 1994). NCET draw a distinction between remediation in which the learner is directed by the software, and support which the learner is enabled by the software, and strongly come out in favour of support. They therefore favour software that promotes activities such as word processing, creative writing, a software simulation of a journey which uses paper worksheets, and working in groups with a floor turtle. In all these activities the computer plays a supporting role within the wider learning experience of group project work.

This preference is not confined to CBL in special education, it is evident in mainstream education too. Some teachers very quickly recognised the potency of groupwork supported by simulations, such as Whittington's (1984) groupwork based on a simulation of the raising of Sir Francis Drake's flagship The Mary Rose, or more recently "information stream simulations" which simulate events taking place over time and in which, for example, children play the roles of government and press handling a plane hijack by terrorists. Anyone who doubts the potency of these kinds of computer supported activities should read Warren (1993).

Conversely, much of the software from the 1980s which engaged children in intrinsic learning experiences such as word sequencing and spelling exercises, activities is which language was the subject matter rather than a tool, is now less favoured. The language software described in the sections above falls more into this category than the one now favoured by teachers. The main way in which a child might use the language software would be as a remedial exercise. The way forward for the language software would therefore seems to be to devise and incorporate it into situations in which children can use language purposefully in activities such as games. These tasks might be one-to-one between child and computer or involve children in pairs or small groups in some task supported by the computer.

In fact we did begin to investigate how we could use the software techniques in more purposeful

situations. We developed programs that set puzzles for the user to solve. The puzzles were essentially non-linguistic, but required the use of language to solve them. One program ("Hidden Shapes") presented hidden pattern of coloured shapes for the user to reproduce. To do this, the user had to ask questions about the relative positions of the hidden shapes, and then use the information from the answers in constructing instructions for manipulating a second set of shapes. A typical dialogue might be:

```
Computer:   I have used the blue triangle.
User:       What is above the blue triangle?
Computer:   The green cross and the green square.
User:       Give me the green cross and the green square.
            Put the blue triangle below the green cross.
            What is below the blue triangle?
... (exchanges omitted)
User:       Have I finished?
Computer:   No, two positions are wrong.
User:       Move the red diamond to the left.
            Have I finished?
Computer:   Yes. Well done!
(The computer reveals the hidden pattern).
```

We also looked at how we might set goals that were extrinsic to the software. One example of this was where two children took turns in giving instructions to a program that discussed the relative sizes of three crosses. One child aimed to make all the crosses as big as possible, the other as small as possible. In these competitive situations, where making a mistake meant losing your turn, children tended to take far more care with their language.

THE POTENTIAL OF TODAY'S TECHNOLOGY

As mentioned above, we began developing the software around 1982. Technology has progressed a lot since then and, after a gap of around 8 years, we have recently started to explore how the software might have developed had the power and capabilities of today's hardware and software tools been available when we started.

Clearly, modern technology has the potential for far more sophisticated programs than those described above. When we recently re-implemented "Hidden Shapes" in Visual Basic as "Hidden Animals", it was easy to include sophisticated graphics (e.g. "What is under the green pig?"), clickable on-screen input buttons (rather than a peripheral device) and a scrollable history of the language exchanged. All these things would have been difficult to implement on the old 32K machines.

We are now beginning to consider further possibilities. Language processing techniques that once required the memory, disk space and processing speed of mainframes can now be implemented on microcomputers. These techniques are capable of handling a large proportion of the structures and concepts that have been shown to cause difficulties for language-impaired children. It should be possible to develop software that deals with subordinate clauses, pronouns, possessive inflections, tense inflections, adverbs, auxiliaries, conjunctions, confusion between "to have" and "to be") and different functions of language such as greetings, the expression of feelings. The software could hold discussions about the everyday objects and concepts used in non computer-based remedial schemes, for example objects such as furniture or fruit, actors and recipients of actions such as people or animals, and actions such as moving, looking, eating and hiding. Software could hold discussions about scenes containing these ideas, with the contents altered by the user's written instructions.

Today's technology also allows better quality of feedback to be provided. For example, because buttons on screen can be dynamically altered (unlike the paper overlays used originally) it is possible to highlight different word or phrase input units, and to vary the complexity of the available language dynamically by enabling or disabling different buttons.

However, the general approach would probably gain wide acceptance only if software was developed to

cover an extensive range of language, so that it formed a substantial computer-based remedial scheme. A scheme like this could be of great value to speech therapists and teachers in their remedial work, but we are still a long way from such a scheme.

Acknowledgement

s I would like to thank Dr Andrew Rostron and Dr David Sewell of the Department of Psychology, University of Hull, with whom I collaborated in this research and who supervised my PhD project, several teachers for correspondence, discussions and access to their classrooms; my recent students who have begun to investigate further possibilities; and the many children who allowed me to observe their interactions with the software described in this paper.

References

Bates M, Beinashowitz J, Ingria R and Wilson K (1981, March). Generative Tutorial Systems. Paper presented to the annual meeting of the _Association for the Development of Computer-Based Instructional Systems_, Atlanta, Georgia, March 3-5, 1981.

Bruner J S (1983). _Child's talk: learning to use language_. Oxford University Press, Oxford.

Bryen D N (1982). _Inquiries into Child Language_. Allyn and Bacon. Boston Massachusetts.

Conrad R (1979). The reading abilities of deaf school leavers. _British Journal of Educational Psychology_, 47, 138-148.

Cooper J, Moodley M and Reynell J (1978). _Helping Language Development. A developmental programme for children with early language handicaps_. Edward Arnold. London.

Dockrell J and McShane J (1993). _Children's learning difficulties: a cognitive approach_. Blackwell, Oxford.

Leonard L (1989). Language learnability and specific language impairment in children. _Applied Psycholinguistics_, 2, 179-202.

McKeown S (Editor) (1991). _I.T. Support for Hearing Impaired Learners_. National Council for Educational Technology, Coventry.

NCET (1994). _A Software Guide for Specific Learning Difficulties_. National Council for Educational Technology. Coventry, U.K.

Quigley S P and Paul P V (1984). _Language and Deafness_. Croom Helm. London.

Sewell D F, Clark R A, Phillips R J and Rostron A B (1979). Language and the deaf: an interactive microcomputer-based approach. _British Journal of Educational Technology_, 11, 57-68.

Ward R D, Lindley P A, Rostron A B, Sewell D F and Cubie R (1985). Computer-Assisted Learning and Deaf Children's Language: Using the Language and Thought Software in a Hearing-Impaired Unit. _Journal of the British Association of Teachers of the Deaf_, 9 (3), 61-66.

Ward R D (1988). Natural language, computer-assisted learning and

language-impaired children. _Unpublished PhD thesis, Department of Psychology, University of Hull UK_.

Warren C (1993). Computer-based information stream simulations: their impact on language and thinking. In Monteith M (Editor), _Computers and Language_, Intellect, Oxford.

Weizenbaum J (1966). ELIZA - a computer program for the study of natural language communication between man and machine. _Communications of the ACM_, 9, 36-45.

Wiig E H and Semel E M (1976). _ Language Disabilities in Children and Adolescents_. Charles E Merrill. Columbus Ohio.

Winograd T (1972). _Understanding Natural Language_. Academic Press, New York.

Return to itdv02n2 Contents Page

Return to Journal Volumes Page

AUDIO DESCRIPTION - SEEING THEATER WITH YOUR EARS

John Miers
National Institute of Mental Health
JMIERS@AOAMH3.SSW.DHHS.GOV

When the lights came up on the Arena Stage production of Ibsen's The Wild Duck, even people who cannot see perceived in the mind's eye a rich variety of colors, lighting effects, levels and movements. Thanks to Audio Description, all theatergoers were able to experience the visually engaging production of this Ibsen classic.

Audio Description is a narration service that offers live commentary and narration for patrons at participating theaters throughout the Washington, DC area, one of a handful of areas in the country where audio description is provided. People desiring this service reserve headphones attached to small receivers, about the size of a cigarette pack. An audio describer narrates the performance from another part of the theater via a radio or infra-red transmitter. The narrator guides the audience through the production with concise, objective descriptions of new scenes, settings, costumes, body language and "sight gags," all slipped in between portions of dialogue or songs.

The audio describer is often referred to as a "verbal camera lens," faithfully and objectively recounting the visual aspects of a production. Qualitative judgments are avoided; listeners must be free to deduce from the commentary. You don't say "He is angry" or "She is sad". Rather, "He's clenching his fist" or "She is crying". Audio describers must convey with the words they choose and the tone of their voices the emotions the actors convey through their body language. Audio description represents a landmark in technology for accessible arts programs, one of the newest developments in efforts to make the arts totally accessible to everyone.

Audio describers are carefully trained to "re-see" theater. Were you to listen in on an audio description training session, you'd hear comments like -- "It wasn't just a dress; it was a pleated, red silk dress." "You should have mentioned the letter-opener when he laid it on the desk. He uses it later to kill her."

THE JOHN F. KENNEDY CENTER FOR THE PERFORMING ARTS, in Cooperation with the National Endowment for the Arts and the Association for Theatre and Disability, presents

THE FIRST ANNUAL NATIONAL CONFERENCE ON AUDIO DESCRIPTION

on JUNE 15 - 17, 1995 at The John F. Kennedy Center for the Performing Arts in Washington, DC.

For more information, contact:

Joel Snyder, Presenting Program, National Endowment for the Arts
W - 202 682-5591; TTY - 202 682-5496; Fax - 202 682-5612
H - 301 431-3008; e-mail: jsnyder@tmn.com

Please use the following REGISTRATION FORM:

THE FIRST ANNUAL NATIONAL CONFERENCE ON AUDIO DESCRIPTION

Name _____
Affiliation _____
Address _____
_____

Phone: _____ Fax: _____
e-mail: _____ TTY: _____

Please use a separate form for each registrant. Payment by check must accompany registration. Please

submit registration by June 2, 1995 to: Joel Snyder, National Endowment for the Arts, Presenting Program, Room 726, Washington, DC 20506

Registration fee of $ 100.00 per person includes attendance at all conference sessions (including coffee/soft drinks service), reception on Thursday, June 15 and lunch on Friday, June 16. (Please attach a note if you have special dietary requirements or other necessary accommodations.) Tickets to the audio-described performance of "Crazy For You" on Saturday, June 17 at 8:00 pm are $50.00 per person.

Registration Fee $100.00

Ticket(s) to "Crazy For You" ($50.00 each) . . . $_____

TOTAL . . . . . $ _____

Please make checks payable to Kennedy Center--Audio Description Conference.

Return to itdv02n2 Contents Page

Return to Journal Volumes Page

ICADD (INTERNATIONAL COMMITTEE FOR ACCESSIBLE DOCUMENT DESIGN): AN INTRODUCTION AND CALL FOR PARTICIPATION

Since its formation in 1992, the International Committee for Accessible Document Design (ICADD) has been dedicated to making information accessible to persons with print disabilities. This includes individuals who cannot use standard printed documents because of a visual, perceptual, or other physical disability.

ICADD was formed following a panel presentation at the World Congress on Technology in December 1991. Delegates recognized the need to develop and promote standards, so that accessible materials could be produced through automated means as a supplement to existing information creation processes.

The Committee first met at the Conference on Technology and Persons with Disabilities (sponsored annually by California State University at Northridge) in March, 1992. Since then, members have gathered at several conferences related to technologies and their applications by people with disabilities. The group collaborates through an Internet list server based at the University of Arizona.

ICADD CALL FOR PARTICIPATION BY REPRESENTATIVES FROM INDUSTRY, EDUCATION, AND THE DISABLED COMMUNITY

ICADD's Statement of Purpose:

The International Committee for Accessible Document Design (ICADD) is dedicated to making printed materials accessible to persons with print disabilities. ICADD is an international nonpartisan consortium of representatives from industry, education, and the disabled community.

To all Interested Persons:

Since its founding in 1992, ICADD has pursued its mission through the efforts of many individuals and organizations. We invite and encourage additional participation by all who support our goal to make printed information accessible to persons with print disabilities simultaneously, and at no greater cost. The attached materials explain our organization structure and practices, and include organization and individual contributor applications.

March, 1995 ICADD Organizational Structure

ICADD exists to provide a framework for collaboration among participating organizations. Our structure has evolved both to maintain a separate identity for ICADD, and to facilitate its ongoing evolution.

A description of ICADD's Governing Practices

ICADD itself is a committee

a. Voting members are the organization representatives in good standing
b. Membership is continuously open to change and evolution
c. Memberships are for a period of 12 months from committee action accepting the membership, unless withdrawn or suspended by committee action

ICADD (as a committee) has duties

a. Act on all membership requests
b. Set goals and objectives for ICADD
c. Seek and appoint working committee chairs from among members, member organizations, and individual contributors
d. Establish responsibilities and goals for working committees

e. Review and act on working committee reports and activities (such as accepting, endorsing, or publishing these reports)

ICADD operates as an e-mail committee

a. It conducts business primarily by e-mail
b. It follows Robert's Rules of Order for E-mail Committees, described separately, to conduct business
c. It plans periodic meetings, at which it may also choose to conduct business

ICADD has a chairman

a. The chair is elected from among members (representatives)
b. Who has agreed to the job
c. For a one year term
d. Who may resign if unable to carry on the duties
e. Whose only specific duty is to keep and issue the "Chairman's Report on the Status of the Meeting". This is described in the "Robert's Rules of Order for E-mail Committees" Description of Organizational Membership

Requirements are:

a. A group with a stated organizational, research, or supporting mission which relates to making documents accessible to persons with disabilities. The written "mission statements" will be included in published ICADD materials as part of the way that we communicate "who" ICADD is and what ICADD stands for.

b. A willingness to participate actively in support of ICADD work. This includes regular participation in the e-mail based "business meetings", and working in other ways toward agreed upon goals.

c. A willingness to commit time and perhaps other resources in support of that participation

d. Designation of a specific representative to ICADD. This is the voting member.

e. Agree that the organization may be named as a member of ICADD (as long as membership is not expired or withdrawn)

f. Completion of the ICADD Membership Application.

Membership is annual:

a. Membership renewal requires resubmission of the membership application, received by ICADD within the final 2 months prior to membership expiration.

b. Membership applications will be accepted (or rejected) by committee action.

c. Upon expiration of membership, an organization will no longer participate as a committee (voting) member. This could be by not submitting a new membership application, or by committee action

d. Former members can always reapply by submitting a new application

Membership may be withdrawn:

a. An organization may withdraw its membership at any time by submitting a request to the committee in writing, which will be routinely accepted by the committee.

b. That organization will then not be considered a member, will not vote, and will not be listed as a member in ICADD documents and papers.

Description of Individual Contribution to ICADD Work

Requirements are:

a. A personal or professional interest which relates to making documents accessible to persons with disabilities

b. A willingness to commit time and participate actively in support of goals

c. Agree to be named as a working committee contributor of ICADD in documents which are prepared by that working committee

d. Complete an ICADD Contributor Biography and submit it to ICADD

Participation is simply by working:

a. For a regular (ongoing) committee

b. On a particular project

Description of ICADD's Working Groups

ICADD has working groups:

a. These may consist of one or more persons

b. They accept goals, responsibilities, and timetables from ICADD (the committee)

c. They do their work and report back to ICADD

d. They may be ongoing or temporary (project) in nature

e. Working groups currently exist for technical, administrative, and promotional activities

- Technical work includes the research and development of standards and practices which will further ICADD's mission

- Administrative work includes operating mechanics for processing, keeping, and publishing records of ICADD work

- Promotional work includes publicizing and seeking support for ICADD, promoting the use of its recommended standards and practices, and education on ways to make documents accessible

The ICADD Membership Application

Application for Membership as an Organization which supports ICADD

The Organization:

Name of Organization _____

Postal Address _____

Phone _____
Fax _____

The Organization Mission:

The stated mission which relates to ICADD's work of making documents accessible to people with disabilities, as it can be published in ICADD materials

_____
_____

Support Offered:

Brief description of resources that the organization can offer in support of ICADD's work

_____

Designated Representative:

Name _____
Title _____
E-mail Address _____
Phone _____

[The representative and others who can contribute should complete individual contributor statement forms]

Agreement with ICADD Statement of Purpose and Practices:

We want to support ICADD's work and agree to ICADD's Statement of Purpose and Practices, dated March, 1995

Signed and submitted by: _____
(Authorized person approving this application)

Date Completed: _____

ICADD Individual Contributor Statement:

Statement of Willingness to contribute to and support ICADD

Contributor Name:

Name _____
E-mail Address _____
Postal Address _____
Phone _____

Organization/University/Company Affiliation:

Title _____

Name of Organization _____
Postal Address _____
Phone _____
Fax _____

Biography:

A brief biographical statement, as it can be published in ICADD materials relating to ICADD work

_____ _____
_____

Support Offered:

Brief description of your interest, time available, and resources that you can offer in support of ICADD's work

_____

Agreement with ICADD Statement of Purpose and Practices:

I want to support ICADD's work and agree to ICADD's Statement of Purpose and Practices, dated March 1995

Signed By:_____

Date Completed: _____

Getting in touch with ICADD:

To apply as an organization (committee) member:

Complete the Organization Application and an Individual Contributor statement for the designated representative.

Send the application to any of the persons listed below, via e-mail or postal mail.

ICADD will act on applications as quickly as possible.

To offer your help as an individual contributor:

First, and most important, get in touch with the working group leader. Current groups and leaders are listed below.

Complete an Individual Contributor statement for ICADD records if you agree to take on working group projects or assignments.

Send a copy to the Administrative working group leader who will update and maintain records

ICADD Chair and Working Group Leaders as of March 1995:

Chairman:

Tom Wesley, University of Bradford t.a.b.wesley@bradford.ac.uk

Working Groups

Technical:

George Kerscher, Recording for the Blind cbfb_gwk@selway.umt.edu

Promotional:

Michael Paciello, Digital Equipment Corporation paciello@usable.enet.dec.com

Administrative:

Chris Brooks, Recording for the Blind cwbrooks@rfb.org

Postal: c/o RFB 20 Roszel Road Princeton, New Jersey 08540 609 520 8098

Return to itdv02n1 Contents Page

Return to Journal Volumes Page

WHAT IS THE INTERNET PUBLIC LIBRARY, AND WHY SHOULD I CARE?

Sara Ryan
sryan@umich.edu
Engineering Library Associate
Internet Public Library Reference Co-Coordinator
Manager of Online Course Materials, ILS 609
http://www.sils.umich.edu/~sryan/HomePage.html

Internet Public Library, n. abbrev. IPL;

1. a site on the World-
2. Wide Web, address http://ipl.sils.umich.edu/
3. an overwhelming, >exhausting, exciting project.
4. a library, consisting of four divisions: Education, Youth, Services for Librarians and Information Professionals, and Reference.

Let me start by quoting from our mission statement:

"the Library itself exists to:

- --provide services and information which enhance the value of the Internet to its ever-expanding and varied community of users
- --work to broaden, diversify, and educate that community
- --communicate its creators' vision of the unique roles of library
- culture and traditions on the Internet."

What does all of this mean in terms of what the IPL can provide for users with disabilities? To answer this question, I'll take you on a division-by-division tour of the IPL. Along the way, I'll tell you about ways in which you can contribute to the IPL to help us become an increasingly useful resource.

Division-By-Division Tour

When you point your Web browser at "http://ipl.sils.umich.edu/", you will arrive at our "lobby"; a homepage which contains both an imagemap with links to the library's divisions, and a link to a text-only version of the IPL. It was important to us to make the library accessible in a text-only version because we wanted to be able to reach more users. The text-only IPL does at least three things: it lets us reach people using lynx or other non-graphical Web browsers, it provides faster access for people with low bandwidth (who don't have to wait for images to load), and, most relevant for this community, it lets blind users access the IPL without having to worry about how their speech programs will deal with images.

We'll be taking the text-only tour, but users should be aware that each of the text-only pages contains a link to a version in "full graphical splendor," and vice versa.

(Note: The text-only IPL has been navigated successfully using the Berkeley Systems speech program OutSpoken for Macintosh. We are interested in hearing of any problems encountered by people using other speech programs to navigate the IPL; please write to ipl@umich.edu.)

Education

The Education Division has no direct link from the homepage, but you can go to its Classroom or to the

Exhibit Hall it sponsors.

I quote from the Classroom page: "The IPL Classroom is a space to discover more about the Internet and to encourage educational discussions among a wide variety of people...We are making plans to create an interactive educational environment. The interactive classroom will be a place that people enter to learn about computing, especially the Internet. Instructors will provide tutorials, ongoing lessons, and answers to students' questions."

The Exhibit Hall is currently hosting some exhibits from the Museum of African-American History in Detroit, Michigan.

The Education Division depends on input from our community of users. The Division would love to provide tutorials on computing for the disabled, or an exhibit of enabling technologies, but they need outside expertise. If you are interested in helping the Education Division in any way, please write to ipl.outreach@umich.edu.

Youth

The Youth division is committed to making the Internet fun for children, using two guides, J.J. the Librarian and Bookie the Bookworm. They currently provide access to a number of stories, one of which, "Molly Whuppie," includes voice narration. They sponsor a set of pages called "Ask the Author" which contains biographical information provided by authors from Lois Lowry to Robert Cormier. They maintain a discussion list on which children can discuss books. "Doctor Internet" helps kids explore science and math Internet resources. The Youth Division is also holding a contest called "Put My Story On The World Wide Web"; they are soliciting stories from children 4-14. Winning stories will become part of the Youth Division's "collection." Write to the IPL Youth Division at ipl.youth@umich.edu.

Services

From the Services homepage: "The Services Division of the IPL is an interactive forum for librarians and information professionals to share their knowledge and experiences with their colleagues. We all have valuable ideas to offer the profession, and the Services Division provides a place for this exchange." This Division features on-the-job resources, discussions about libraries and technology, professional development for librarians, issues of interest to librarians and information professionals, and reviews of information products. Write to the IPL Services for Librarians and Information Professionals Division at ipl.svcs@umich.edu.

Reference

I've saved Reference for last, both because our resources may be of the most immediate use to disabled patrons, and, selfishly, because Reference is the division with which I'm affiliated, and I want to show it off. We currently provide two main services: access to a Ready Reference Collection, and an email-based facility for patrons to ask us reference questions. Soon we will be adding an interactive reference environment. The Ready Reference Collection has resources in the following areas: General Reference, Business/Economics, Computers, Education, Entertainment, Environment, Government & Law, Health & Nutrition, Humanities, Internet, Libraries & Librarians, News/Current Events, Science, and Social Issues & Social Services. Each resource consists of a hypertext link to a resource, a paragraph describing the resource, the author of the resource (sometimes with an email address), and keywords which can be used to search the collection with our experimental search engine. As an example resource, in our Social Issues and Social Services collection, there is a section on disability-related information. One of the resources available is the full text of the Americans with Disabilities Act. The Reference Division is interested in recruiting librarians to help us answer questions, and non-librarians to serve as subject experts in any number of areas. For further information about volunteering to assist the Reference Division, send mail to me, sryan@umich.edu.

Why Should I Care?

I hope I've already made it clear from my description why you should care. The IPL is a collaborative enterprise, and the more collaboration we get, the better an enterprise it will be. So come visit us. Write to us. Ask us reference questions. We look forward to hearing from you!

Return to itdv02n2 Contents Page

Return to Journal Volumes Page

DEPARTMENT

JOB ACCOMMODATIONS

JOSEPH J. LAZZARO
LAZZARO@WORLD.STD.COM
MASSACHUSETTS COMMISSION FOR THE BLIND

LIGHT AT THE END OF THE TUNNEL?

Since Microsoft Windows entered the software market, blind and visually impaired computer users have been gravely concerned about the accessibility of an operating system that uses graphics instead of text to convey information. Even the newest and best Windows screen readers are unable to function as reliably as their text- based counterparts. Without going into technical details, Windows does not work well with screen readers, and the problems are inconsistent and sometimes unpredictable. This state of affairs has led to lost job opportunities, and in some cases lost jobs altogether. If workers who are blind are to prosper in the workplace, significant changes must be made to the Windows operating system. Windows must be made more compatible with assistive technology, particularly with screen readers that cannot obtain sufficient information from the operating system to function reliably.

Over the past several years, several Windows-based screen readers have been developed and marketed. This first generation of Windows-based screen readers represent one of the most heroic feats of software engineering to date. Unfortunately, Windows itself lacks internal hooks to enable speech, Braille, and enlargement packages, forcing adaptive software developers to spend hundreds of hours extracting simple information from the tangle of data. In the DOS world, obtaining this information was much easier because of the 80 by 25 character text buffer. No such buffer exists for Windows, but that may be changing for the better.

LOBBYING

Recently, several national and state disability organizations came together to inform Microsoft of the problems Windows is creating for the disabled community. The Massachusetts Commission For The Blind, the Massachusetts Assistive Technology Partnership, National Council On Disability, and various consumer organizations, banded together to demonstrate the incompatibility of Windows 3.1 with screen reader software to other state agencies responsible for purchasing and management information systems. Our thesis is that Windows was not accessible, and that state agencies were at risk of breaking the law by purchasing it for use within state government. The law in question here is Section 508 of the Rehabilitation Act that basically states that office automation equipment must be accessible to persons with disabilities. The good news out of all this is that it convinced Microsoft to come to the bargaining table. After lengthy negotiations with the software giant, Microsoft has agreed to make Windows '95 more accessible across- the-board, and to work specifically on issues relating to screen reader access in general. The following is a brief outline of the changes Microsoft will make in the soon to be released Windows '95.

NEW ACCESS FEATURES

Microsoft has agreed to a fairly long list of changes to be made to the operating system, plus other changes that will make their documentation more immediately accessible. Here is a brief outline of most of these changes.

Microsoft will contract with Recording For The Blind to provide accessible manuals and documentation. This will allow blind and print disabled persons to receive manuals and software documentation much more quickly. This agreement extends to books and manuals printed by Microsoft Press.

The Windows Access Pack, formerly an add-on product, will now be available out of box with Windows '95. The Access Pack will be made part of the Control Panel for Windows '95, and will not have to be ordered separately. The new Access Pack for '95 will be expanded and standardized. The pack includes features for hearing and motor impaired computer users. Future plans are to expand the Access Pack with new features, such as a possible screen magnifier.

Microsoft will involve disabled computer users, and adaptive vendors, in their reliability testing projects. Whenever a new program is written, disabled users will have the opportunity to test it out with their adaptive equipment.

New staff are being hired at Microsoft to work on the adaptive effort. Chuck Opperman, formerly with Henter Joyce, is currently leading a programming team. Staff positions are currently available.

Microsoft has purchased the Henter Joyce off-screen-model to enable future screen reader development. An OSM is a critical part of a Windows screen reader. having a built-in OSM will make it easier to write future screen readers.

Microsoft is also publishing enhanced guidelines for their independent software developers. These guidelines describe how to write more accessible applications. Unfortunately, Microsoft has not yet agreed to withhold their logo for programs that do not measure up to this unenforced accessibility standard. But Microsoft has agreed to expand their relations with screen reader developers and developers of mainstream software to iron out bugs and incompatibilities.

Getting help may be easier with Windows '95. Microsoft is integrating all help facilities in Windows into a single help system. This will allow users to get help anywhere in the program, and the newly implemented access features will also contain links in the help text.

Users with low vision or who need screen customization will find '95 more accessible. All screen attributes can be set by the user. This includes the size of characters and icons, as well as the contrast level. This will make it easy for Microsoft to develop these features into a full-blown screen magnification package. The mouse pointer will be changeable by the user, making it easier to see for many applications. This will prove useful for users with vision impairments using screen enlargement. It could also prove useful for other disabilities.

A user name and password system will be implemented in '95 to assist with access and mainstream customization. All access features can be attached to a specific user name, allowing users to customize the system to their liking. When a new user logs onto the system, they simply type their name to activate any or all desired access features. This will allow multiple users to share the same system, while each user will have the ability to customize it according to their own needs.

Windows '95 may prove easier for adaptive vendors to write applications under if Microsoft increases support to this community of developers. Vendors of assistive technology will receive free beta and pre-release software from Microsoft in order to get a jump on creating new assistive applications. This will make it easier and faster for the adaptive vendor community to roll out new products. Many vendors are now porting their Windows 3.x screen readers over to '95. It is expected that several screen readers will ship at the same time Windows '95 is available.

Microsoft is preparing a catalog of assistive technology to aid consumers in locating adaptive hardware and software products. This catalog should be useful for locating Windows based assistive hardware and software. It is expected to be slim on non-Windows adaptive products. Microsoft is also preparing a document on the many different ways to customize Windows '95.

According to Microsoft, Windows '95 is expected to be released late this summer or in early fall. Not all access features are expected to be in place at that time, but Microsoft will ship quarterly "tune up kits" to allow users to add new features as they roll off the assembly line.

Microsoft has also established an electronic mail address on the Internet for people who want to ask

questions about Microsoft access products. This is not for general questions about adaptive technology. Users can write to enable@microsoft.com

TRUST BUT VERIFY

I can honestly say that I am impressed with what Microsoft is claiming to accomplish. If they are successful, it will result in a more accessible environment for users with disabilities. Unfortunately, there is still a lot of fear and mistrust in the disabled community. Only time will tell. I am confident that if the disabled community continues a vigorous dialogue with Microsoft we will all have a more accessible workplace in the future. I encourage you to write Microsoft and express your thoughts, and offer encouragement and suggestions. This is more than about the right to use a computer; it is about the right to access information. In the modern world, access to information is the key to success and employment. We should all work to make information widely available and easier to access. We should create a world where all can share information, a world where abilities rather than disabilities are the motivating factor.

Joseph J. Lazzaro is director of the Adaptive Technology Program, Massachusetts Commission For The Blind in boston. He is also a freelance writer, with numerous publications on assistive technology.

Return to itdv02n2 Contents Page

Return to Journal Volumes Page

(ITDV02N2 ONLINE)

DEPARTMENT: ONLINE INFORMATION AND NETWORKING

Steve Noble, Recording for the Blind
slnobl01@ulkyvm.louisville.edu

GOPHER NEWS

AFB

The American Foundation for the Blind has a new gopher, thanks to funding from the MCI Foundation. This gopher site was designed to provide a wide range of information services to people who are blind or visually impaired as well as to other concerned individuals. To reach the AFB site, gopher to:

gopher.afb.org 5005

DISCUSSION LISTS

KIOSK-L

KIOSK-L is a new listserv developed by the Trace Research and Development Center, and is concerned with access to information kiosks and other touch screen systems by people with disabilities.

To subscribe, send e-mail to:

listproc@trace.wisc.edu

leave the subject line blank, and in the body of the message say:

SUBSCRIBE KIOSK-L Yourfirstname Yourlastname

NIFL-ALLD

The National Institute for Literacy (NIFL) in cooperation with the National Center for Literacy and Learning Disabilities have recently created a list to discuss various aspects of learning disabilities.

To subscribe, send e-mail to:

listproc@novel.nifl.gov

leave the subject line blank, and in the body of the message say:

SUBSCRIBE NIFL-ALLD Yourfirstname Yourlastname

TRAVABLE

The Travable list was formed to discuss all aspects of travel for people with disabilities. The intended purpose is to allow a format to share ideas on how to improve the travel experience for anyone with a disability.

To subscribe, send e-mail to:

listserv@sjuvm.stjohns.edu

leave the subject line blank, and in the body of the message say:

SUBSCRIBE TRAVABLE Yourfirstname Yourlastname

From a BITNET node you may also send the following interactive message:

tell listserv at sjuvm sub travable Yourfirstname Yourlastname

EDUDEAF

EDUDEAF is a new list for teachers of students who are deaf or hearing impaired.

To subscribe, send mail to:

listserv@ukcc.uky.edu

leave the subject line blank, and in the body of the message say:

SUB EDUDEAF Yourfirstname Yourlastname

WORLD WIDE WEB

EASI

It is indeed very fitting that our first issue to focus on Web sites under the Online Information and Networking Department should mention that EASI itself has begun construction on a Web site. EASI now has both a home page for general activities as well as a home page dedicated to disseminating information about access to science, engineering and math information. The EASI

Web address is:

http://www.rit.edu/~easi

DO-IT

The DO-IT (Disabilities, Opportunities, Internetworking and Technology) Program now has a Web page. Offerings include links to science education resources, ftp sites, and information about adaptive technology.

The Web address is:

http://weber.u.washington.edu/~doit

DISABILITY RESOURCES, PRODUCTS AND SERVICES

Disability Resources, Products and Services is a Web site devoted to the needs of people with disabilities. This site is sponsored by Evan Kemp Associates (EKA), a company that provides information, products and services to people with disabilities. This site includes a Disability Mall, informative newsletters, and links to other disability related sites.

The Web address is:

http://disability.com

DISABILITY AND PHYSICAL ACTIVITY

This new Web site has been designed as an information resource for researchers, coaches, athletes, teachers, physiotherapists and students in higher education. It includes an annotated bibliographic database on wheelchair sports and information on the International Paralympic Committee.

The Web address is:

http://info.lut.ac.uk/research/paad/home.html

APPLE COMPUTER

Apple Computer's Worldwide Disability Solutions Group now has a site on the Web. Resources include articles about physical disabilities, visual impairments, learning and speaking disabilities, and assistive technology.

The Web address is:

http://www.apple.com/disability/welcome.html

Return to itdv02n2 Contents Page

Return to Journal Volumes Page

(ITDV02N2 Campus)

DEPARTMENT: CAMPUS COMPUTING

Editor: Daniel H. Chalfen, Ph.D.
University of California, Los Angeles
Danny@UCLA.edu

Guest Contributor: Harry Murphy, Ed.D.,
California State University, Northridge
hmurphy@huey.csun.edu

"CENTERS OF ENERGY:" A MAJOR STUDY OF DISABILITY AND INFORMATION TECHNOLOGY ACCESS IN POST-SECONDARY EDUCATION IS NOW READILY AVAILABLE

To provide equal access to academic opportunity, colleges and universities everywhere must establish adaptive computing technology support services for their students with disabilities. This challenge raises a host of questions: How should we go about doing this, and how can we avoid reinventing the wheel? Where can we get solid information on how other campuses with innovative and successful programs have done this? Our campus is different than your campus, maybe we need a different model? We already have a support program, but how have other schools done it so we can learn from their experience and encourage our administration to support our efforts?

A major report commissioned by the National Council on Disability provides a wealth of information to help us address these important questions. Released in 1991, "The Impact and Influence of Exemplary Programs Offering Technology Support to Students with Disabilities" is the most comprehensive study available on how a wide variety of adaptive computing technology support programs became "Centers of Energy," impacting accessibility both on and off-campus. The study's author and our guest contributor, Dr. Harry Murphy, here outlines some of the study's many useful findings.

The report is now readily available through the National Clearing House for Rehabilitation Training Materials (NCHRTM), Order Number 214.012. It is available in print ($6.50 U.S., including shipping), computer diskette ($5.00), and via BBS (tel: 405-624-3156). It will be made available in the near future over the Internet via World Wide Web and Gopher. The original draft of the report, which I highly recommend to practitioners, offers more nuts and bolts detail than the final report, and will be made available shortly though the NCHRTM. Contact the NCHRTM at Oklahoma State University, 816 West 6th Street, Stillwater, Oklahoma 74078. Phone orders:

1-800-223-5219.

AN OVERVIEW OF CENTERS OF ENERGY

by Harry J. Murphy, Ed. D., Founder and Director, Center on Disabilities, California State University, Northridge hmurphy@huey.csun.edu

In 1991 I had the good fortune to conduct a study for the National Council on Disability, "The Impact of Exemplary Technology-Support Programs on Students with Disabilities," a study of electronic access to equipment and information on the part of students with disabilities. The following campuses are included in the report: Gallaudet University, Baruch College, University of Michigan, University of Wyoming, Michigan State University, California Community Colleges, University of Minnesota, UCLA, University of Washington, University of Nebraska, University of Missouri, University of New Orleans, El Centro College (TX), Southern Connecticut State University, Grossmont Community College, and CSUN.

My major findings were these: campuses dealing with technology and persons with disabilities became "Centers of Energy" that influenced many others on and off-campus. They energized others to become involved in technology. They assisted others in starting programs. I also found that campuses tended to deal with one of two models: a "centralized" model, typified by technological services within an Office of Disabled Student Services. The other is the "distributed" model, typified by services rendered by a Computer Center.

The centralized model is helpful for training students on computers and access devices but it tends to group all students with disabilities into just one area of campus -- an inhibition to true electronic mainstreaming.

The distributed model is based upon the assumption that electronic services for all students, including students with disabilities, is a function of Academic Computing, Computer Center, or similarly named organizational units. Usually there is a specialist within this Center who takes responsibility for identifying appropriate software and assistive devices, training, and campus-wide deployment of assistive technology support for students with disabilities. At least one effort that began under a centralized model turned all of its equipment and service needs over to a distributed source on campus.

Finally, one of the strongest findings was how administrators creatively used 504/ADA issues of equal access to justify the creation of new technology programs within an institution. There were some exciting trends such as encouraging students to use telecommunications, placing accessible computers in housing areas, grants to purchase equipment and initiate training programs, creating tuition-driven entrepreneurial ventures that covered training costs, and involving many on-campus areas in the delivery of services to students with disabilities. Those participating in the funding freely shared information about their funding history and each offered tips to someone wishing to start a new program.

A series of recommendations were made concerning the establishment of electronic services, funding, and research. The Report supports EASI's efforts to stimulate greater access to electronic equipment and information on campuses across America.

Return to itdv02n2 Contents Page

Return to Journal Volumes Page

Information Technology and Disabilities

2:3 (August 1995)

Copyright Statement

Articles

Technological Access and the Law
L. Scott Lissner

Abstract: Beginning with an overview of the Rehabilitation Act of 1973 and the Americans with Disabilities Act, this survey identifies the legal issues surrounding equal access to computing facilities on college campuses.

Conference Report:
Access to GUIs: Setting Accessibility Standards for Computer Systems
Doug Wakefield

Abstract: Is it possible to establish objective performance standards to assess a computer system's ability to provide access to graphics-based applications for people who are blind? This was one of the main issues debated at the Access to GUIs conference held in Menlo Park, California, in May of this year. The focus of the conference was access to graphical user interfaces (GUIs) by people who are blind or visually impaired. Sponsored by the Western Blind Rehabilitation Center of the Department of Veterans Affairs, Stanford University's Project Archimedes, and Sensory Access Foundation, the three day series of meetings was attended by vendors of access equipment as well as representatives from universities and corporations. This report discusses the action taken by the Center for Information Technology Accommodations in the area of testing the accessibility of computer systems purchased by the U.S. government.

Maintaining Lynx to the Internet for People with Disabilities:
A Call to Action
Richard Seltzer

Abstract: The trend toward graphical user interfaces, and graphical information in general, has been perceived as threatening to the continued independence of blind and visually impaired computer users. This article identifies the primary obstacles and their possible solutions -- in particular, the importance of the text- based WWW tool, Lynx.

Departments

Job Accomodations
Joe Lazzaro, Department Editor
lazzaro@world.std.com

Online Information and Networking
Steve Noble, Department Editor
slnobl01@ulkyvm.louisville.edu

Return to the EASI Homepage

Return to the ITD Homepage

Last updated 20 June 1996.

TECHNOLOGICAL ACCESS AND THE LAW

L. Scott Lissner
Longwood College
Farmville, VA 23909-1899
e-mail: slissner@lwcnet.lwc.edu

"It is possible to envision situations where an insistence on past requirements and practices might arbitrarily deprive genuinely qualified handicapped persons of the opportunity to participate in a covered program. Technological advances can be expected to enhance opportunities...qualify them [individuals with disabilites]...to enable the attainment of these goals [equal opportunity and non-discrimination]..." U.S Supreme Court decision; 442 U.S. 406 (1979)

LEGAL ISSUES

Three trends provide the context for this article: first, the increasing role of electronic information, telecommunications and computing technology in the academic infrastructure; second, the changing demographics of the college population; and third, the evolution of the legal principles and requirements concerning access to equal opportunities for individuals with disabilities. After establishing a context, this article will provide an overview of federal legislation, and recommend a pro-active approach to increasing access to technology on college campuses.

THE CONTEXT

In the twenty-two years since Section 504 of the Rehabilitation Act was signed into law, computers and related technology have evolved from huge machines dedicated to a few technical disciplines into a common tool used by most students and faculty. Applications software, from word processing to statistical packages, have become integral to many courses. Card catalogs are rapidly becoming quaint relics as they are replaced by library databases and CD ROMs. The Internet is becoming an increasingly important source of information (the Association of Academic Research Libraries has cataloged over a thousand electronic journals and lists). Increasingly, success in college means access to the tools and products of information technology as well as access to the traditional learning environments such as libraries, laboratories and classrooms.

There has also been a steady increase in the number of students with disabilities participating in higher education. The American Council on Education (ACE) has surveyed the national cohort of first-time full-time entering students annually since 1966. The survey indicates that the number of students with disabilities beginning college as full-time students has increased by more than 300%. In 1978 (when ACE began collecting information on students with disabilities) 2.6% of the respondents indicated that they had a disability; by 1991, that figure had climbed to 8.8% (Henderson, 1992). Based on the data available, at both the secondary and post-secondary levels, the number of students with disabilities on campus can be expected to continue to grow until this population represents 10% to 15% of the students on any given campus.

The Rehabilitation Act of 1973

Title V of the Rehabilitation Act of 1973 is considered the first federal civil rights legislation for persons with disabilities. Title V addresses non-discriminatory hiring practices in federal agencies (Section 501); established the Architectural and Transportation Barriers Compliance Board (Section 502); requires affirmative action clauses for employment of qualified individuals with disabilities in contracts with primary federal contractors (Section 503); requires non-discrimination in employment and the provision of services by all programs receiving federal funding (Section 504); establishes remedies for discrimination and assigns regulatory responsibilities for enforcement (Sections 505-507).

The 1986 amendments to the Act mandated the development of accessibility guidelines (FIRMR) for electronic office equipment purchased by federal agencies (Section 508). This landmark legislation is

still in force and served as a foundation for the Americans with Disabilities Act (ADA).

The Americans with Disabilities Act (ADA)

The Americans With Disabilities Act is divided into five Titles. Title I covers non-discrimination in private sector employment. Title II requires that both public transportation and the facilities, programs, and services of state and local governments be made accessible to individuals with disabilities. Title III requires that public accommodations, e.g., shopping malls, restaurants and theaters, be made accessible to persons with disabilities. Title IV requires that telecommunication services be made accessible to persons with hearing and speech disabilities. Title V contains miscellaneous provisions relating to the previous four Titles (e.g., exemptions for historic sites), remedies, and regulatory jurisdiction.

A principle difference between the ADA and its predecessor is coverage. The Rehabilitation Act covers the recipients of federal funds. The ADA extends coverage to private entities as well as state and local governments in addition to recipients of federal funding. In addition to extending civil rights protection for individuals with disabilities into the private sector, the enactment of the ADA has raised both public awareness and the awareness of individuals with disabilities of their rights.

State and Municipal Laws:

It is beyond the scope of this article to survey the disability-related laws of each state. Both the ADA and the Rehabilitation Act defer to any local legislation that requires a higher standard of access. In essence, the federal legislation represents a minimum mandate for access.

WHAT DOES IT MEAN TO MY CAMPUS?

The outline above provides a sense of the coverage and impact of the federal legislation but what does it mean in terms of access and campus computing? With the exception of telecommunications and the purchase of equipment by federal agencies, the federal legislation and regulations do not specifically address the issue of technological access on the college campus. However, the general mandates for access to educational programs and services form a foundation for developing a practical set of guidelines.

A review of the legislation, the regulations, and the case law under the Rehabilitation Act and the ADA was used to produce this summary. This summary can be used to establish access policies and procedures for campus computing.

The Rehabilitation Act covers all programs at institutions that receive any federal funds. This includes direct funding as well as financial aid funds for students. All institutions are covered by the ADA. Since both laws require the same level of educational access, the Department of Justice (DOJ) will refer complaints concerning postsecondary education to the Department of Education's Office of Civil Rights under the Rehabilitation Act. This DOJ policy allows for both the most efficient use of enforcement manpower and the use of the case law developed under the Rehabilitation Act.

The regulations developed under Section 504 of the Rehabilitation Act state that the activities that must be operated in a non-discriminatory/accessible manner include but are not limited to recruitment, admission, academic programs, support services, housing, financial aid, student employment, athletics, recreation, transportation, and extra-curricular programs (34 Code of Federal Regulations 104).

The courts have found that if the location, delivery system, instructional methodology, or evaluation method limit the participation, access, or ability to benefit of students with disabilities then reasonable modifications are required to provide access. The courts have further indicated that individuals with disabilities are entitled to an equal opportunity to participate in and benefit from the academic community. Access to the academic community has been interpreted to include meaningful access to libraries, laboratories, campus services, recreation facilities, housing, and non-credit workshops or courses in the most integrated setting possible (United States of America v. The University of Alabama, 908 F.2d. 740, 1990; Southeastern Community College v. Davis, 442 U.S. 406, 1979). Specific

adaptations that have been upheld include the provision of sign language interpreters, adaptive technology in the classroom, adapted laboratory equipment, test format modifications, adaptive telecommunications devices, and the provision of information in alternative formats (Braille, tape, etc.).

There are only three limits to the types of accommodations or modifications that are considered reasonable. First, accommodations of a personal nature, e.g., prescription devices or personal attendants. Second, modifications that fundamentally alter the nature of the program or service being provided. Third, modifications that pose an undue financial or administrative burden on the institution. Most of the case law involves disputes over whether or not a particular modification represents a fundamental alteration in an academic context. To date, there are no cases where the defense of undue financial burden has been successfully argued.

WHAT DOES IT MEAN TO CAMPUS COMPUTING?

Since computing and information technology have become an integral part of the academic experience, it is clear that it must be accessible to all students, faculty, and staff. Meaningful access begins with notice and includes access to the facilities, equipment (input), the results (output), documentation, and technical support.

Notice

Willingness to embrace the spirit of the law is meaningless if students are unaware of their right to request reasonable accommodations. Information materials should include a notice on whom to contact to request such accommodations. The campus disabilitiy services officer can provide advice on methods of identifying students, providing notice and evaluating requests. If your campus does not have an Office of Disabilities Services, it should have a Compliance Officer/ADA Coordinator (the federal regulations require that every institution assign someone these responsibilities). As you work on notice you will want to establish procedures for requesting accommodations, evaluating requests, and arranging or purchasing requested aids and services. Depending on institutional policy, requests may be handled directly or through the Office of Disabilities Services. Utilizing the expertise of Disability Services or the Compliance Officer is probably the best way to have requests evaluated for need.

Developing these procedures with other service providers on campus will provide an opportunity to conduct an analysis of the adaptive computing needs of current students, faculty and staff. A needs analysis is important in developing priorities for designing a fully accessible service. A committee to develop a computing transition plan for this purpose is recommended. This planning committee should include representatives from Computing Services, Library Services and Disability Services as well as individuals with disabilities, and faculty. In the short-run this committee will develop a structured plan to meet current adaptive computing needs. In the long-run, planning committees typically establish permanent campus adaptive computing support units.

Facilities

Facilities access includes access to the building as well as furniture and equipment, e.g., adjustable or wheelchair height tables. For guidance on physical access issues, refer to the Computer Users Survey in the appendix and the UFAS of ADAAG guidelines (see under "Publications," below). The guidelines mentioned are the federal building codes for access; your campus director of buildings and grounds should have a copy. The distribution and location of computing technology on campuses takes many configurations. In developing an access plan, keep in mind that the Rehabilitation Act requires "programmatic access." Programmatic access means that not every location needs to be accessible but that all services, software, etc. must be made available in some accessible locations that provide comparable access. The regulations emphasize the need to provide this access in the most integrated setting possible (after all, separate but equal is an outdated concept). It is reasonable to provide a baseline level of accessibility (physical access, Access DOS or similar software, etc.) at every major facility (library, labs, etc.) and have separate or limited areas that house highly specialized equipment (voice input/output, Braille output, etc.).

Input/Output Devices

Addressing the range of adaptive devices is beyond the scope of this survey. For a discussion of available devices and their use the reader should contact EASI [Equal Access to Software and Information (see resource list)]. The Functional Performance Specifications for Technology Accessibility published in the Federal Information Resource Management Regulations also provides useful guidance in selecting accessible technology.

From a legal point of view, requests for adaptive devices that allow a comparable level of use of the available technology are reasonable requests. Where there are multiple options for accomplishing access, the institution can choose considering the needs of other users, compatibility, cost, etc. The individual making the request should be involved to ensure the end results provide meaningful access.

Technical Support

In general, technical support and training make the use of technology possible on our campuses. Without these vital services, students, faculty and staff would not know what is available, what can be supported by the institution's technology infrastructure, how to integrate applications with current technology, and how to use what has been purchased. Technical support and training allow members of the campus community to become increasingly sophisticated users of the available technology. As a vital service, technical support must also be accessible to individuals with disabilities. Access to technological support can be thought of as a continuum with three major reference points: standard services, consulting, and dissemination.

Standard technological support services offered to the campus community as a whole must be accessible to individuals with disabilities. General training sessions (computer lab orientations, use of applications software, library technology, etc.) should be in accessible locations. Sign language interpreters and accessible workstations at training sites must be provided when requested. Additionally, assistance with ordering, installing, and maintaining adaptive technology should be available at the same level as any other hardware/software on campus. Moving up the continuum, Computing Services consults with individuals to identify adaptive solutions and provides the needed training to ensure that adaptive software/hardware is usable. At the end of the continuum, Computing Services plays an active role in disseminating information about adaptive technology by providing demonstrations, consulting with departments, computer labs, businesses, local school systems, etc. on developing accessible sites. The letter of the law clearly requires that standard services be accessible. The spirit of the law suggests that consulting services should be provided. A pro-active stance would include dissemination.

Documentation

Accessible documentation (electronic text, audio tape, Braille, etc.) is necessary for the meaningful use of technology. Documentation includes both user manuals for hardware/software and any training materials, simplified directions, or other in- house materials. All of these materials must be available in "alternative formats" that are accessible to users. The choice of format is determined by the user. For example, a faculty member who is blind might use materials on tape, in braille, or on disk with a screen reader. Depending on the professor's background and the type of material under consideration, these three formats do not provide equivalent access. Audio tape is a linear/sequential format and technical materials often require recursive reading. In such a case, a request for Braille over tape is not a preference but a requirement for meaningful access.

As a rule, having the materials on disk is the most flexible. Screen readers are fairly equivalent to tape and conversion to Braille is possible through the use of adaptive technology. If your institution does not own this equipment, there are services, including State Rehabilitation Services as well as private companies, which can convert electronic materials into Braille.

A Word About Costs

Costs should be considered second. The first question should always be "is the request reasonable and

what solutions are available that would provide access?" Next, according to the U.S Dept. of Labor and the Jobs Accommodation Network, most accommodations (approximately 81%) cost less than $1000.

These realities to the side, cost can be a difficult issue. Experiences with the mandate for physical access in the Rehabilitation Act demonstrate the advantages of being proactive rather than reactive. Retrofitting facilities piecemeal based on each request is both inefficient and expensive. It is recommended that infrastructure accessibility expenses be included in the annual budget cycle. You will also want to discuss budget issues with Disability Services. Classroom accommodations are often funded from a central budget and physical access renovations are often funded from reserve maintenance budgets. Can computing services tap these sources? You may be able to obtain funding from private sources and individuals on campus who are clients of the Department of Rehabilitation Services may have access to funds to assist in meeting their needs.

DISCUSSION QUESTIONS

Campus Computing to Disability Services:

Who on campus is responsible for nondiscrimination policy administration?

How can we work together to develop a proactive campus- wide policy for technology access?

How can we best establish the current and future needs for technology access?

How are various types of access projects and accommodations currently being funded?

Disability Services to Campus Computing:

What adaptive technology is already on campus?

What programs and departments have most heavily integrated computing as part of students' academic experience?

What are the most widely utilized aspects of Campus Computing (word processing, library databases, etc.)?

How can we work together to develop a proactive campus- wide policy on technology access?

FIRST STEPS

1) Meet with representatives from the campus Disability Services Office. Review established policies and procedures in the context of technological access and identify any missing elements. Review the current level of technology access in the context of current and anticipated needs.

2) Host an informal meeting with the Offices of Disability Services, Affirmative Action, Legal Counsel, Business Affairs/Budget and Campus Computing. Discuss the results of your review and the need for developing a work group with Disability Services.

3) Establish a working group to develop policies on technological access and devise an access plan to be implemented over time.

RESOURCES

Organizations and Programs

Association on Higher Education And Disability.
P.O. Box 21192
Columbus, OH 43221-0192

(614) 488-4972 (V/T)

Equal Access to Software and Information.
Internet: EASI@EDUCOM.EDU
(714) 830-0301

PUBLICATIONS

Computers and Student With Disabilities: New Challenges for Higher Education. EDUCOM, Project EASI, The Inter-University Communications Council Inc.; Washington, D.C. (1989).

Title By Title: the ADA's Impact on Postsecondary Education, By Jane E. Jarrow. AHEAD, P.O. Box 21192, Columbus OH 43221-0192. (614) 488-4972 (V/TT).

Subpart E: The Impact of Section 504 on Postsecondary Education, By Jane E. Jarrow. AHEAD, P.O. Box 21192, Columbus OH 43221-0192. (614) 488-4972 (V/TT).

ADA Handbook (Free) U.S. Department of Justice, 10th Street & Constitution Avenue N.W., Washington, D.C. 20530, (202) 724-2222 or (202) 724-7678 (TT).

Standards and Guidelines for Building Access - UFAS and ADAAG (Free) Architectural & Transportation Barriers Compliance Board, 330 C Street S.W. Room 1010, Washington, D.C. 20201 (202) 653-7834

Summary of Existing Legislation Affecting Persons With Disabilities (Free). U.S. Department of Education, Office of Special Education & Rehabilitation Services, Clearinghouse on the Handicapped, Washington, D.C. 20202.

REFERENCES

Henderson, C., (1992) College Freshmen With Disabilities: A Statistical Profile. Washington, D.C American Counsel on Education.

Southeastern Community College v. Davis, (1978). 442 U.S. 406 U.S of America v. The Univ. of Alabama, (1990).908 F.2d. 740, 11th U.S. of America v. The Univ. of Alabama. (1990) 908 F.2d. 740, 11th Cir.

U.S. Department of Education (1992). Eleventh Annual Report to Congress on the Implementation of the Education of the Handicapped Act. Washington D.C.: Government Printing Office.

U.S Department of Justice (1992). Technical Assistance Manual for The Americans With Disabilities Act. Washington, D.C.: Government Printing Office.

P.L. 93-112, The Rehabilitation Act of 1973. 29 U.S.C. 791, 1991.

P.L. 101-336, The Americans With Disabilities Act. 42

U.S.C. 12101, 1991.

Return to itdv02n3 Contents Page

Return to Journal Volumes Page

CONFERENCE REPORT:
Access to GUI[As
Vallombrosa Conference Center
Menlo Park, California
May 23 - May 26, 1995

SETTING ACCESSIBILITY STANDARDS FOR COMPUTER SYSTEMS

Is it possible to establish objective performance standards to assess a computer system's ability to provide access to graphics-based applications for people who are blind? This was one of the main issues debated at the Access to GUIs conference held in Menlo Park, California, in May of this year. The focus of the conference was access to graphical user interfaces (GUIs) by people who are blind or visually impaired. Sponsored by the Western Blind Rehabilitation Center of the Department of Veterans Affairs, Stanford University's Project Archimedes, and Sensory Access Foundation, the three day series of meetings was attended by vendors of access equipment as well as representatives from universities and corporations. This report discusses the action taken by the Center for Information Technology Accommodations in the area of testing the accessibility of computer systems purchased by the U.S. government.

The topic of standards for accessible systems is nothing new. However, in the past, these discussions were often quite narrow in scope, usually focusing exclusively on access software rather than on the accessibility of complete systems. The degree to which a computer system is accessible, however, depends upon the hardware platform, the applications being run and the type of adaptive system being used to provide access to the system. As the computing community moves increasingly toward graphical systems, access for people who are blind is becoming more dependent on the total design of computer systems.

The U.S. government purchases computer systems which are intended to perform very specific tasks. When an agency, such as the Social Security Agency or IRS, wants to purchase new equipment, it distributes a request for proposals (RFP) and contractors propose various systems to meet the requirements set forth therein. Often, RFPs contain references to accessibility by people with disabilities. To meet these requirements, large contractors often collaborate with smaller accessibility vendors. In the past, problems have arisen due to the fact that many contracts are awarded without the accessibility of a system being tested or proven. As a result, agencies often purchase systems which are inaccessible and fail to live up to expectations. Both the agency's administration and the disabled employee suffer when this occurs.

The lack of testing is the main motivation for the Center for Information Technology Accommodations at the General Services Administration to begin spearheading performance benchmarking that can be tested for all government purchases. This proposal was presented at the GUI conference. Below is a summary of the Center's approach and reactions at the conference.

SETTING BENCHMARKS FOR TESTING

The Center for IT Accommodation is proposing that government purchasing decisions be based on performance testing results from an independent facility. This testing process would be used as a way of measuring a system's ability to meet the specific requirements set forth in an agency's RFP as well as for small purchases from the non-mandatory contract schedules. Rather than being concerned with just access, the benchmarking process would look at the entire system.

Hardware Considerations--When a computer system is equipped with hardware or software to make it useful for people with disabilities, it always involves the addition of either input or output devices that must operate concurrently with all other computer functions while remaining "transparent" to those functions. For this reason, adaptive technologies operate most efficiently on systems that "tolerate" a wide variety of add-ons. Because adaptive systems replace or enhance either the basic input or output schemes of the computer, they therefore utilize computing resources such as hardware interrupts, I/O

addresses, and extra memory. The resources utilized by the normal operations of the computer and those used by an adaptive system often conflict, leaving the system either inoperative or inaccessible. For these reasons, a system's hardware can be tested and judged as to its accessibility on a wide range of hardware considerations ranging from the number of ISA slots to the use of proprietary plugs and connectors.

SOFTWARE CONSIDERATIONS

When testing a system's ability to be made "accessible" it is necessary to take into consideration both the operating system software and the specific applications required by a purchaser. Over the last decade, the manufacturers of adaptive equipment have concentrated on designing systems to work in the DOS environment. There is also some work being carried out by a few companies that has resulted in various access systems for the Macintosh. With the growing popularity of MicroSoft Windows software, Some of these same manufacturers have ported their technology to the Windows environment. Almost no research or development has taken place to make UNIX systems accommodate adaptive systems, but there are exceptions. A project based at Georgia Tech has been exploring ways to make X-Windows under UNIX usable by blind and visually impaired people. A group of companies including Sun, IBM, and DEC have formed a consortium to develop software standards for applications running under X-Windows so they can be made accessible. As a result of the variations in operating systems' accessibility, it is necessary that any testing program assure that functioning access systems exist for the operating system under consideration.

Software Applications

The accessibility of any system depends a great deal on the applications being run. Like hardware components, those software programs that attempt to be unique in their approach to such things as the method of screen writes or keyboard handling often run the risk of being inaccessible. The reason for this is quite simple. The producers of access systems have to predict how software programs will operate. The access packages for Windows assume that applications are following the programming conventions of Windows. When an application employs a unique approach to the way it interacts with the Windows environment or the computer, there is no way for access programmers to predict what the application is attempting to do.

Also, an application's accessibility for people who have a visual disability depends on how well the programmers of that application have used alternative methods from the graphical interface to present information in a fashion that can be accessed by a screen reading software package. Currently, both Microsoft Inc. and companies working on the X-Windows applications are working to develop accessibility guidelines for others to follow. These guidelines will be used as a measure of systems' accessibility.

Access Applications Considerations

A distinction should be drawn between evaluating an access package's ability to provide access and its user interface. User interfaces are often very subjective in their appeal. While some users may prefer an approach that allows all functions to be initiated from the keyboard, other users may prefer separate keypads or other devices so there is no chance for keyboard conflicts between the access program and the applications being accessed. When evaluating an access product's performance, emphasis should be on what information the product can provide rather than on how it provides that information.

Conference reactions

Many concerns about this proposal were raised at the GUI conference. In general there does seem to be widespread agreement among all the participants that some type of standards need to be established. However, the concerns expressed included:

Who is going to establish the accessibility standards for adaptive equipment?

How will testing of systems be carried out, i.e., will real users be involved?

Is there any mechanism that can ensure either vendors or agencies will insist that benchmark testing to be done?

How do you take the subjective aspects of access out of the testing process?

Finally, who'll pay for the testing - the purchaser or seller?

The Center for IT Accommodations is moving ahead on this project with assistance from conference attendees. The National Software Testing Laboratory is one source for continued discussion on this issue. This laboratory already conducts similar performance benchmarks, exclusive of accessibility, for the Canadian government. Discussion with Canadian counterparts to CITA regarding enhancing this existing program to address access is likely.

What benefit will all this have for the non-government employee? The government is the single largest purchaser of computing systems in the country. Government buyers today, at all levels, are easily persuaded to the requirements and benefits of technology that accommodates all users. No one wants to be responsible for a failure in this area. They are looking for ways to buy technology with greater confidence that their investments will be accessible to all users. If developers know that the accessibility performance of their products will be published in BYTE magazine and readily available worldwide on the Web to all buyers, including Federal, state, and local government buyers, then it should raise the overall level of accessibility awareness among all companies, and all consumers will benefit.

Return to itdv02n3 Contents Page

Return to Journal Volumes Page

MAINTAINING LYNX TO THE INTERNET FOR PEOPLE WITH DISABILITIES: A CALL FOR ACTION

Richard Seltzer
B&R Samizdat Express
http://www.tiac.net/users/samizdat

The combination of "adaptive technology" and the Internet opened the world to many visually impaired people. Before, they were limited to audio tapes and Braille books, and books with extra large type, all of which are difficult and expensive to produce. That meant that only a small portion of the literature and information available to everyone else was open to them.

Then computer technology led to the development of a variety of devices that can turn plain ASCII text into voice or show it as extra large letters or even provide Braille output. And the Internet, through applications such as e-mail, newsgroups, ftp and gopher, provided an almost inexhaustible supply of information in plain text form.

Many blind people became Internet gurus. The Internet was the ultimate equal-opportunity, global environment, where no one knows if you are blind or have three feet or your skin is purple. What does matter are your ideas and your ability to communicate them, as well as the respect and care that you demonstrate toward others in this public arena.

For the sighted Internet user, the arrival of the World Wide Web and graphic browsers like Mosaic and Netscape was a glorious revolution. Suddenly, they could point and click their way with ease from one end of the world to the other, without bothering about complex addresses. The world of the Internet became like a CD-ROM (only slower), with information easily viewed and manipulated in a Windows environment, and with the welcome addition of great color graphics, the beginnings of video, and even audio. Over the last year, it seems that everyone has been scrambling to put up a Web server. Great work is being done. But if the only way to get to it were with a graphics interface, the blind would be locked out and consigned once again to the role of second-class citizens.

Fortunately, a handful of people at the University of Kansas in Lawrence, Kansas, (Lou Montilli, Charles Rezac, and Michael Grobe) developed a character-cell browser named Lynx, and made the code freely available over the Internet. According to Lynx Users Guide Version 2.3 (http://www.cc.ukans.edu/lynx_help/Lynx_users_guide.html) "Lynx is a fully-featured World Wide Web (WWW) client for users running cursor-addressable, character-cell display devices (e.g. vt100 terminals, vt100 emulators running on PCs or Macs, or any other cursor-oriented display). It will display hypertext markup language (HTML) documents containing links to files residing on the local system, as well as files residing on remote systems running Gopher, HTTP, FTP, WAIS, and NNTP servers. (Lynx is currently available via anonymous FTP from ftp2.cc.ukans.edu/pub/lynx)

Simply put, Lynx delivers documents from the World Wide Web as plain ASCII text characters. This means that they can be "read" by the blind, as well as people who are limited to character-cell (no graphics) access to the Internet.

So there is a solution available for the blind, but lack of awareness limits its usefulness. Many blind people who could use this capability still do not know that it is available. And many people who now run or are building Web sites seem to be unaware of the importance of Lynx, and are designing their pages without taking into account that means of access. In other words, many exciting and interesting Web sites (such as HotWired -- produced by Wired Magazine, and located at http://www.hotwired.com/) are so heavily dependent on graphics that it's impossible to gain access to them with Lynx.

If you know an Internet user who is blind, tell them about Lynx. If you know someone who is building a Web server, remind them that they should design their pages with text-only alternatives for maneuvering from one place to the next and not depend on the user's ability to see icons and fancy graphics.

If this issue is particularly important to you, then on your own or with the help of volunteers systematically visit and evaluate the usability of popular Web sites based on a LYNX view and send constructive criticism and/or praise to the Webmasters who designed them, to Web-related newsgroups, and to editors of Internet-related magazines (Interactive Age, Internet World, Web Week).

If you know someone who designs, builds or sells Internet-related computer products or on-line information services, remind them that if they or their customers do business with the U.S. government they may at some time be required to make their information accessible to the blind, and Lynx can help them accomplish this.

If you know someone who is involved in the further development of Web server software and html authoring tools, encourage them to make it easy for the creators of Web pages to see how their work will appear with a Lynx browser as well as with the full graphics.

And if you know someone who is involved in the further development of Lynx, remind them how important that tool is for the blind; futher, urge them to consult with blind users for advice on features they should include in future versions. Audio technology, for example, could open entirely new Internet possibilities for the blind Internet user. New sites, created by the blind, might provide unique, previously unimagined multi- media experiences for the sighted as well as the blind user.

As a sighted person, I can only try to imagine adapting to living in a world that is always dark or near dark. To maneuver successfully through a dark room you need to carry in your head an image of the space around you, which you edit as you encounter the unexpected. From experience, you expect the unexpected, are aware of what might be encountered, how to evaluate it on the fly, and how to adjust and continue.

To relate to this mode of perception, I try playing blindfold chess and am soon bewildered by the challenge. Try carrying an image (which may not even be a visual image) not only of the board and the current position but also of the expected continuations: the likely next moves and their evaluation and consequences, and also a healthy awareness of the unexpected: the potential for sacrifices and deep combinations, for positional as well as material threats and opportunities. Some of the best chess players actually go through this exercise to train their minds for this kind of multi-dimensional awareness, to get beyond knowledge that relies upon vision.

The sighted person gains confidence and the leisure of complacency from what he or she sees. To see is to believe. To perceive that an object is in one state or position rather than another is to eliminate from consideration that it might be otherwise, to limit the possibilities. The sighted person -- above all the person who relies heavily on visual perception and visual modes of thought -- expects clarity, stability, and predictability, and hence may be less aware of ambiguity and latent potential, and less able to respond when what seems to be the case proves mistaken or uncertain. The blind person requires a multi-dimensional awareness and an openness to react quickly to the unexpected simply to maneuver safely through ordinary space. These are qualities that can prove quite valuable when maneuvering through cyberspace.

Arguably, the blind are more at home in cyberspace than the sighted. In cyberspace (and the related concepts of virtual reality and alternate reality), the blind should be considered as a special resource. Companies wishing to lead the way in virtual reality should actively recruit the blind -- not to conform to laws about hiring the disabled and not because it is politically correct, but rather because their minds are not totally dominated by visual paradigms. They can imagine, and with computer technology can simulate, what to the sighted is unimaginable. And in the vast, ever-expanding, and always unexpected realm of the Internet, they can conceivably learn to be first-class navigators, superbly able to recognize new business opportunities and to adjust to new circumstances on the fly.

For starters, companies designing next-generation virtual reality environments should recruit the blind. Visual simulation is relatively easy today; the REAL breakthroughs will likely involve the non-visual.

And given this potential, those same high tech companies should give serious consideration to the needs

of the blind early in their design cycles rather than as an afterthought. Otherwise, by putting the blind at a disadvantage, by limiting the best access routes to cyberspace to the sighted, they cut themselves off from the resource that could take them a step beyond the competition and help them move far into the future.

Return to itdv02n3 Contents Page

Return to Journal Volumes Page

(ITDV02N3 JOBS)

DEPARTMENT: JOB ACCOMMODATIONS

JOSEPH J. LAZZARO
lazzaro@world.std.com

Anyone who is aware of trends in adaptive technology is at least peripherally aware of the current dilemma with access to graphical user interfaces. The GUI access issue has been slowly and steadily costing people their jobs and livelihoods, not to mention a lot of sobering nail biting. There is still a lot of fear and confusion in the community. The stakes are high, and we're playing for keeps! As a blind person, I am gravely concerned about the developments in access to graphical user interfaces. As project director for an equipment loan program, I see real people impacted by this issue every day on the job. In order to combat the GUI obstacle, I armed my consumers and myself with the most powerful screen readers as they entered the market. I have worked with and tested all of the graphical screen readers using speech output. These evaluations have been an interesting process fraught with fear, hope, and painful progress. I am pleased to see that Windows 3.x screen readers in general are becoming more sophisticated and robust, although many perhaps unsolvable problems remain with the current Windows operating system. Our best hope is with the new Windows 95 platform, which should be released by the time you read these words. I am also pleased to report that Microsoft is making major changes to the Windows 95 operating system to make it more accessible across the board to persons with disabilities. The bad news is that these sweeping changes will take two to three years to complete. The list of changes was made evident at a ground breaking conference sponsored by the Redmond software behemoth.

MICROSOFT SUMMIT

In July, I attended the Access to Windows 95 conference, held at Microsoft Corporation in Washington State. As its title implies, the conference focused on efforts being made by Microsoft to make its Windows 95 operating system more accessible to persons with disabilities. Access by blind and visually impaired users was a prominent topic at the conference as blind access poses the greatest challenge to Windows developers. At the conference, Microsoft staff informed us that it would take two to three years to make Windows 95 and its applications fully accessible. This sounds like a long time to wait, but the work that remains to be done is staggering.

SYSTEM HOOKS

The first step is to imbed the necessary hooks and functions into Windows 95 to enable speech, Braille, and large print access packages. These hooks have to be tested and proven in real world applications with a new generation of adaptive hardware and software written specifically for Windows 95.

OFF SCREEN MODEL

Microsoft is also writing code to make the lives of adaptive software developers a lot easier. An off-screen-model (OSM) is currently under construction to assist screen access utilities. the OSM will keep track of what is on the screen, giving a screen reader an accurate list of objects to query. The OSM will not be available until the middle of 1996.

OTHER ACCESS FEATURES

Microsoft is also building additional access features into Windows 95, such as a screen magnifier, captioning and description hooks, alternative keyboard and mouse assistants, and more. Future plans include voice command and control functionality. The good news is that the current suite of access features will not be a clumsy add-on but will be part of the default installation package.

GUI SCREEN READERS

Below is a list of the available GUI screen readers that are currently shipping from their respective companies. I have included a brief description of each product, as well as company contact information. You are urged to contact the various vendors for more specific information. This is intended only as a capsule summary of the products currently available, and does not include products that are undergoing beta testing. Included are screen readers that run under Windows and OS/2 as well as Macintosh platforms.

IBM SCREEN READER/2

IBM's Screen Reader/2 is a screen reader program for persons with vision impairments. The software is capable of converting screen information to speech or Braille to make IBM's OS/2 Graphical User Interface accessible to persons who are blind or visually impaired. Screen Reader/2 is designed to run with OS/2 and Warp in all sessions. The program can monitor the screen and automatically verbalize desired objects. The Autospeak function monitors the screen and provides voice output of OS/2 screen information. A dedicated 18-key keypad controls Screen Reader/2 functions to enhance productivity by reserving the keyboard for application functions. Screen Reader/2 can be controlled from the keyboard as an alternative. Reading functions allow the user to read complete screens, paragraphs, sentences, words, or letters, reading only the desired information. Customized voice profiles are provided for the most popular programs. By using the Profile Access language, a profile can be modified or created. Built-in Host/LAN support enables connectivity. The windowing capability provides easy access to many display formats used by popular applications. Screen Reader/2 recognizes and verbalizes icons to keep the user informed of screen activity and cursor movement, and the program also emulates mouse functions like point and click. The system includes on-line and audio cassette documentation. OS/2 Screen Representations are provided in raised line format.

IBM Independence Series Information Center
P.O. Box 1328, Internal Zip 5432
Boca Raton, FL 33429
800-426-4832

JAWS FOR WINDOWS

Jaws For Windows is a Windows-based screen reader for persons with vision impairments. The software comes bundled with several installation disks, and six hours of audio cassette training tapes. Jaws for Windows works with most Windows applications, and will read only Windows applications. In order to read DOS applications, you need the optional Jaws screen reader for DOS. Both products support a wide variety of external and internal voice synthesizers. Jaws supports the standard Windows navigation keys, thereby allowing the user to control applications using the keyboard rather than the mouse. Its built-in assistant alerts the blind user to the layout and command structure of Windows. At the press of a key, Jaws announces, "You are in a dialogue box, use the tab key to move from field to field." The off-screen model used in Jaws was purchased by MicroSoft for incorporation into Windows 95 to act as a backbone to future screen readers. A macro language is provided to allow the speech output to be customized from application to application. The macro language can be used to read portions of the screen on command or to chain screen reader commands in sequence.

Henter-Joyce, Inc.
2100 62nd Ave. North
St. Petersburg, FL 33702
800-336-5658
813-528-8900

WINVISION

Winvision is a Windows-based screen reader which is also intended for persons with vision impairments. The software works with most commercial Windows applications, and supports the Artic

and DECtalk voice synthesizers. The package includes a speech synthesizer card, screen reading software for both DOS and Windows, external speaker, headphones, and audio cassette documentation. The software can also be purchased with the Artic Transport speech synthesizer, a portable, battery-powered unit. Winvision comes bundled with Artic Business Vision, a DOS-based screen reader that reads most text-based software. The complete Winvision & Business Vision package can read both DOS and Windows applications.

Artic Technologies Inc.
55 Park St
Suite 2
Troy, MI 48083
810-588-7370

OUTSPOKEN FOR WINDOWS

Outspoken is a Windows-based screen reader for persons with vision impairments. The software was designed to read Windows applications, and works in conjunction with DOS-based screen readers, allowing the user access to familiar DOS access software. Outspoken automatically tracks and speaks mouse and cursor movements, and reads icons and other graphical objects on command. Outspoken verbalizes dialogue boxes, radio buttons, and other graphical controls, and can be used with many Windows-based applications packages. The screen reader supports most commercial synthesizers, including Dectalk, Accent, Sonix, and the Sounding Board. Outspoken comes with tactile reference sheets which show the layout of typical Windows screens, making it easier for persons with vision impairments to learn Windows. The system manuals are also provided on audio tape and computer disk. A Macintosh version is also available. (Outspoken for the Macintosh was the first GUI screen reader to enter the adaptive market.)

Berkeley Access
2095 Rose St.
Berkeley, CA 94709
510-540-5535

PROTALK FOR WINDOWS

Protalk for Windows is a screen reader program for use with Microsoft Windows applications programs. Protalk can be used to read the screens of text-oriented Windows applications, like data bases, spreadsheets, word processing packages, etc. The software is compatible with digital multi-media sound cards such as the Sound Blaster. Protalk supports a wide range of commercially available internal and external voice synthesizers. Protalk for Windows is automated, so no configurations are needed to start using the program. Its multiple read-out hot keys are applicable to most Windows programs. The command keys are focused around the number pad. Documentation is available in alternative formats.

Biolink Computer R & D Ltd.
140 W. 15th St., Suite 105
North Vancouver, BRC V7M 1R6
CANADA
604-984-4099

SLIMWARE WINDOW BRIDGE

Slimware Window Bridge is a screen reader program designed to provide access to both DOS and Windows for the Braille or synthetic speech user. The program automatically provides information within Windows - including window titles, menu selections, prompts, error messages, and command buttons - without requiring customized configuration files or templates. Slimware will also navigate the mouse in Windows, automatically identifying each item of information as the mouse is moved. The mouse Audio Sensor allows the user to hear the mouse pointer move on the screen. A horizontal or vertical mouse locking guarantees straight movement of the mouse pointer in any direction. Control of

the mouse pointer can also be achieved from the keyboard. A Help Mode gives access to the location on the keyboard of any Window Bridge command as well as to a Quick Reference Tutorial for any Window Bridge feature. Verbal or Braille identification labels are user-defined for any level of function keys for any Applications Program. The program features a built-in 120+ function financial, hexadecimal, metric conversion and scientific calculator. Manuals are available in alternative formats.

Syntha-Voice Computers, Inc.
800 Queenston Road
Suite 304
Stoney Creek Ont L8G 1A7
Canada
905-662-0565

WINDOWS MASTER

Windows Master is a screen reader for persons with vision impairments who require access to the Windows 3.x operating system. The software tracks both the standard cursor and mouse, and can verbalize Windows and other graphical objects. Online documentation is available. Windows Master supports a number of internal and external voice synthesizers, including the Braille 'n Speak.

Blazie Engineering
105 East Jarrettsville Road
Forest Hill, MD 21050
410-893-9333

SCREENPOWER FOR WINDOWS

ScreenPower is a Windows-based screen reader for persons with vision impairments. The software can drive both a voice synthesizer and Braille display. ScreenPower allows the user to move with audio or tactile verification among different "levels" in the Windows operating system. The package assists the user in navigating through Windows. Documentation is provided in alternative formats.

Telesensory Corporation
455 North Bernardo Avenue
PO Box 7455
Mountain View, CA 94039
415-960-0920
800-227-8418

Return to itdv01n2 Contents Page

Return to Journal Volumes Page

(ITDV02N3 ONLINE)

DEPARTMENT:

ONLINE INFORMATION AND NETWORKING

Steve Noble, Recording for the Blind & Dyslexic
slnobl01@ulkyvm.louisville.edu

RFB&D NEWS

If you have not heard the news yet, you will probably find the name change in my affiliation credit somehow puzzling. The big news at RFB since the last issue of _ITD_ is that, as of July 1 we are now RFB&D: Recording for the Blind and Dyslexic. After more than a year of market research, RFB's board of directors decided it was time to change the organization's name to better reflect the consumer population we serve. Almost 60 percent of RFB's current borrowers have dyslexia or other perceptual learning disorders, and that percentage is expected to rise in the coming years. RFB&D hopes that by using a more inclusive name we will be able to reach out to an ever-growing population of print-disabled users.

RFB&D may be reached on the Internet by sending e-mail to our information center at INFO@RFBD.ORG

DISCUSSION LISTS

AUDIODESCL

AUDIODESCL is a new listserv intended for discussion about the growing art of Audio Description, which makes movies, live performances and public events accessible to individuals who are blind or who have low vision. AUDIODESCL allows describers, consumers, presenters, and others the opportunity to discuss problems and explore new techniques in description services. To subscribe, send e-mail to: listserver@lists.acs.ohio-state.edu

leave the subject line blank, and enter the following line of text as the message:

SUBSCRIBE AUDIODESCL Yourfirstname Yourlastname

TEAMWORK

The TEAMWORK mailing list is for the discussion of all aspects of family life that are effected by the disability of one or more family members. All family members are invited to join.

To subscribe, send e-mail to:

listserv@sjuvm.stjohns.edu

leave the subject line blank, and enter the following line of text as the message:

SUBSCRIBE TEAMWORK Yourfirstname Yourlastname

From a BITNET node, you may also send the following interactive message:

tell listserv at sjuvm sub teamwork Yourfirstname Yourlastname

WORLD WIDE WEB

ADA DOCUMENT CENTER

A new web site, the Americans with Disabilities Act Document Center, has recently been established. It contains documents relating to the ADA which have been reviewed either by the EEOC or the U.S. Department of Justice. It also provides links to other Internet sites containing legal or disability-related information such as OSHA and the Job Accommodation Network. The web address is:

http://janweb.icdi.wvu.edu/kinder/

You may also access the ADA Document Center via EASI's web at http://www.rit.edu/~easi under the menu called EASI's List of Disability Laws and Related Documents.

NLS

The National Library Service for the Blind and Physically Handicapped is now accessible on the web. Currently, the web site is similar in content to the NLS section of the Library of Congress gopher. If you have never used the Library of Congress Information System, you may obtain a guide to searching the catalog by FTP at ftp.loc.gov/pub/NLS/online.search.guide . The NLS web address is: http://lcweb.loc.gov/nls/nls.html

PROJECT ARCHIMEDES

Stanford University's Project Archimedes was commissioned to promote equal access to information for individuals with disabilities by influencing the early design stages of future computer-based technologies. Project Archimedes is currently involved in designing several prototypes of devices and systems that will be of assistance to individuals with disabilities. To access the Project Archimedes home page, use the following web address:

http://www-csli.stanford.edu/arch/arch.html

IBM

IBM has established a home page especially for disability- related product information. This new home page, titled IBM Special Needs Solutions, was set up to highlight many assistive devices and software tools that make computers more accessible to persons with vision, hearing, speech, mobility, and attention/memory disabilities. To access the IBM Special Needs Solutions home page, use the following web address:

http://www.austin.ibm.com/pspinfo/snshome.html

Return to itdv02n3 Contents Page

Return to Journal Volumes Page

Information Technology and Disabilities

2:4 (December 1995)

Copyright Statement

Articles

Introduction:
Information Technology and Access to Libraries: A Special Issue
Tom McNulty, Editor-in-Chief, *ITD*

Enhancing Library Service for Patrons with Disabilities Through
Staff Sensitivity Training and Specialized Bibliographic Instruction
Marilyn Graubart

mgraubart@cctr.umkc.edu

The AD-A-P-T-A-B-L-E Approach: Planning Accessible Libraries
Alan Cantor

The Rise of the Graphical User Interface
Alistair D. N. Edwards

alistair@minster.york.ac.uk

Universal Access and the ADA:
A Disability Access Design Specification for the New UCLA Library On-line Information System
Daniel Hilton-Chalfen, Ph.D. and Sharon E. Farb

Access to Library Internet Services for Patrons with Disabilities:
Pragmatic Consideration for Developers
Courtney Deines-Jones

Levelling the Road Ahead:
Guidelines for the Creation of WWW Pages Accessible to Blind and Visually Handicapped Users
Judith M. Dixon, Ph.D.

Recording for the Blind and Dyslexic:
The Development of an Internet Accessible Online Catalog
Steve Noble

Return to the EASI Homepage
Return to the ITD Homepage

Last updated 20 June 1996.

ITDV02N4 INTRO

INFORMATION TECHNOLOGY AND ACCESS TO LIBRARIES: A SPECIAL ISSUE

Tom McNulty Editor-in-Chief mcnulty@is.nyu.edu

A few years ago, when the Americans with Disabilities Act was new and causing much concern among librarians and library administrators, it was difficult to find an issue of any major library science journal that did not address the legal issues surrounding access to library facilities and services. Librarians' interest in providing access to their services and collections is not new, but attention in the 90s seems to have shifted away from what we can do toward what we must do for our user-population with special needs.

The rapid refinement of adaptive technology over the last decade or so has probably generated more questions than it has provided answers vis a vis access to libraries and their collections and services. With this in mind, earlier in the year the editorial board of the quarterly electronic journal _Information Technology and Disabilities_ decided to devote an entire issue to library access; we're pleased to announce that this issue will also appear in print in the near future as a special issue of _Library Hi Tech_.

Our initial call for articles, sent out electronically to most of the major discussion groups in the areas of education and rehabilitation as well as librarianship, generated a great deal of interest, and the articles which follow represent the best of those submitted. Not surprisingly, many of the articles submitted for inclusion in this special issue focus on information technology in general, and access to Internet-based resources in particular, and the arrangement of articles reflects this trend.

Our first article, a case study by Marilyn Graubart of the University of Missouri in Kansas City, details a staff sensitivity program for front-line professional and support staff; in this model, the user population with disabilities is included among other diverse populations, including international and racial/ethnic minority students.

Both _Information Technology and Disabilities_ and _Library Hi Tech_ are concerned with the integration of technology in the library, and the remaining articles of this special issue illustrate this fact. Alan Cantor, an Ontario-based adaptive technology consultant, shares his blueprint for access with his article "The AD-A-P-T-A-B-L-E Approach: Planning Accessible Libraries;" The article's acronym refers to Assistive Devices, Alternative formats, Personal support, Transportation services, Adapted furniture, Building modifications, Low-tech devices and, finally, Environmental adaptations. Cantor advises librarians not to be seduced by the myriad high tech devices available on the market today, but rather to incorporate both high and low tech solutions into the overall plan for access.

Since the advent of the microcomputer era, individuals with disabilities have become accustomed to an unprecedented level of information access. The character-based IBM-compatible family of computers engendered a number of hardware and software access products, ranging from Braille to synthetic speech and/or large print output. The proliferation of graphical user interfaces, or GUIs, poses an obvious threat to continued independence to networked and other computer-based information resources. While seemingly formidable, the access problems posed by GUI-based systems are not as insurmountable as was once feared.

Before going into the several articles which deal with graphical information, our next article, by Alistair D.N. Edwards of the University of York, describes the early history of the graphical user interface and identifies reasons for its appeal to a wide range of users. It is interesting to note that several researchers, including Dr. Edwards, saw the rise of the GUI as inevitable, and embarked upon the ground-breaking research which has led to the access solutions "in the works" for perhaps the most ubiquitous of GUIs, Microsoft Windows.

Many libraries have, or are planning to implement, GUI-based OPACs and multimedia workstations which will have the ability to present video and sound as well as images and text from a wide range of sources. Planning for the conversion from text- to graphics-based systems must not exclude the needs of individuals with disabilities. In our next article, "Universal Access and the ADA: A Disability Access Design Specification for the New UCLA Library Online Information System," authors Daniel Hilton Chalfen and Sharon E. Farb describe the "disability-sensitive" specification adopted by UCLA in planning its ORION2 system. By addressing the needs of disabled users from the start, this forward-thinking specification will surely make the transition from the character-based (ORION) to graphics-based (ORION2) system easier for users with disabilities and will most likely serve UCLA well in the long run by avoiding the often expensive process of "retrofitting" an inaccessible system.

Increasingly, libraries are offering remote access to resources, such as online catalogues, as well as bringing other such resources into their own libraries. In her article "Access to Library Internet Services for Patrons with Disabilities: Pragmatic Considerations for Developers," author Courtney Deines-Jones identifies pitfalls and offers sensible solutions to potential barriers to full Internet access. Like the other articles in this issue, Deines-Jones highlights the potential of technology but cautions service providers not to overlook the sometimes obvious and inexpensive modifications which can make a world of difference to the patron with special needs. Deines- Jones' article provides a most comprehensive checklist of barriers and available solutions to the issue of full integration into the library -- as well as via remote dial-up access -- by libraries offering Internet resources.

Our final article on access to the Internet addresses accessibility of World Wide Web (WWW) documents. The big challenge vis a vis WWW documents is their multi-sensory nature. In "Levelling the Road Ahead," author Judith Dixon, Consumer Relations Officer for the National Library Service for the Blind and Physically Handicapped, describes a number of solutions to the creation of WWW pages which provide maximum access to the textual portion of documents for blind and visually impaired users who rely upon text-based Web browsers like LYNX. The screen design principles outlined here offer a simple solution which is transparent to non-disabled users; that is, the aesthetic component of the pages is not compromised in the name of simplified design and access for individuals with special needs.

Most of the resources discussed in the bulk of this issue are relatively new. The Internet has only been around for a few decades, and widespread access is an even more recent phenomenon. Before there were computer-based resources, people with print impairments relied upon human readers and special format texts, notably Braille and later audio and large print. In the last article, author Steve Noble of Recording for the Blind and Dyslexic discusses that agency's new online catalogue, which uses the Internet to make its holdings available to subscribers. RFB&D is the world's largest producer of educational materials in recorded format, and has more recently introduced electronic (diskette-based) resources among its offerings. Beginning with a candid discussion of RFB&D's online catalogue and ordering system, Noble discusses the importance of independent access to the agency's holdings and describes improvements to the system which are in-the-works.

As editor-in-chief of Information Technology and Disabilities, I would like to thank Ed Wall, publisher of Library Hi Tech (Pierian Press), for agreeing so eagerly to co-publish this issue; Ken Wachsberger, journals editor at Pierian Press, who put so much time and effort into it as well; and to the editorial staffs of both journals. Finally, we were fortunate to attract top-notch authors and our thanks go to them, as well as to the many reviewers whose constructive criticism was appreciated by the authors as well.

Return to itdv02n4 Contents Page

Return to Journal Volumes Page

TRAINING AND SPECIALIZED BIBLIOGRAPHIC INSTRUCTION

Marilyn Graubart
Business Reference Librarian
University of Missouri-Kansas City
Miller Nichols Library
5100 Rockhill Road
Kansas City, MO 64110
mgraubart@cctr.umkc.edu

The University of Missouri-Kansas City (UMKC) is one of four campuses of the University of Missouri (UM). As an urban university, it is committed to serving the needs of urban society. It provides undergraduate, professional, and graduate schools, and the university's catalog states UMKC's dedication to public service related to community needs and resources. The University Library's vision statement calls for service supporting the information resources needs of UMKC and the community. In the past two years, the library has pursued fulfillment of this mission by offering improved service to students, staff, and community users with disabilities.

In the past several years, the library has increased its use of automated reference resources. This includes a university- wide online catalog to the UM libraries' book and journal collections, numerous CD-ROM and online periodical indexes to materials located in libraries all over the world, and multi- media reference publications such as encyclopedias and dictionaries. Students attending UMKC pay a computer fee based on the number of credit hours for which each student is registered. These funds are monitored by a campus Computer Student Fee Committee. The Libraries have been awarded funds to provide access to electronic information resources for students by this committee. Two adaptive technology workstations with software and peripheral equipment to be used by students with vision disabilities also were provided to the campus main library, the Miller Nichols Library, by this committee. Currently, one workstation is for patrons with no vision and the other one is for patrons with limited vision. In addition to the computers which allow access to the library's CD-ROM network and online catalog, there is a scanner, a speech synthesizer, a braille printer, and a regular printer.

In the spring of 1993, two librarians in the Miller Nichols Library Reference Department received a "diversity grant" for $10,000 from the campus to offer additional library services to UMKC patrons with special needs. This included international students, persons with disabilities, and racial and ethnic minority students. The grant had three objectives: (1) to improve the ability of students to conduct library research independently by expanding the library instruction program to better serve the needs of persons with physical disabilities, international students, and racial and ethnic minorities; (2) to improve library services by increasing the sensitivity and understanding of the library staff toward persons with physical disabilities, international students, and racial and ethnic minorities; and (3) to improve access to information and to enhance the library's collection to better serve persons with physical disabilities. This article will concentrate on the grant activities concerning persons with physical disabilities.

Phase I: Staff Sensitivity Training

The staff sensitivity training program began in the Fall of 1994 with the presentation of workshops for all full time staff of the Miller Nichols Library. UMKC's Counseling Center staff conducted the workshops. The two reference librarians directing the diversity grant had an initial meeting with the director and assistant director of the Counseling Center in July, 1994, and discussed three factors: (1) the goals they wished to accomplish through training; (2) the primary areas in the library where staff and patrons had personal contact; and (3) the number of sessions and the number of people who would take part in the training. Additional goals, besides increasing sensitivity and awareness among library personnel towards differences and similarities of people from a variety of cultures and with varying levels of ability, were to create an image that the library is a helpful place sensitive to these differences, and to provide full time staff with the skills which would enable them to impart what was learned during training to part time staff (including student assistants) not included in the training.

The Counseling Center staff agreed with the two librarians that active participation by the attendees promoted greater interest than lectures, and were eager to conduct a program in which the participants were fully involved. It was decided to hold two half-day sessions of three hours each. A memo was sent to all full-time employees (55 people) explaining the program, listing the dates, and inviting them to register. Supervisors strongly encouraged or required their employees to attend. By mid-August, everyone had signed up to attend sessions to be held in mid and late October. Staff arranged for the sessions to be held in a conference room in the Library and to serve light refreshments. The Counseling Center sent out a preliminary questionnaire to library employees (to be returned anonymously) asking them what issues or situations regarding diversity they would like to see addressed in the training program and what they expected to gain from attendance. About half of the staff returned the questionnaire.

Each session, attended by fifteen to twenty library employees, was conducted by the Counseling Center's director, associate director, and three counseling center student interns. The emphasis of the first session was on gaining sensitivity, and the emphasis of the second was on acquiring skills. One of the activities the first day consisted of a label exercise, "treat me as if..." in which everyone had to determine what role was assigned by a label each wore on his or her back. One person might be labeled blind, another hearing impaired, another with limited English language, another an African-American male, etc. The group mingled to receive feedback from others who related to them because of their labels. They paired up to find out who they were, and discussed with the entire group their reactions to the exercise. In a "Stand-Up-Sit-Down" exercise, everyone who fit into a certain category (e.g., divorced, of a certain age, belonging to a particular religious group) had to stand up, and their colleagues often were surprised at what categories others fit. Attendees frequently divided into small groups of three or four to discuss various issues brought up in the general sessions. A video on managing diversity was shown.

During the second session, the group discussed values and communication styles of people from different societies and cultures, participated in exercises which tested their own communication skills, and brainstormed in small groups about how to make the library a welcome place for its diverse population-- patrons and staff. A panel of students representative of this population (international students, students with physical disabilities, gay and lesbian students, minority students) spoke to the group about their expectations and needs related to the library, and the audience asked them many questions. Evaluation forms were filled out at the end of the second session.

In order to locate students to participate in the panels, the two librarians worked with the Office of International Student Affairs, recruited international students who work in the library, contacted the Gay and Lesbian Student Organization on campus, and talked with the person on campus responsible for working with students with physical disabilities. Between four and seven students participated in each panel, and there was a different panel at each session. Two of the three sessions had students with physical disabilities on the panel, and one panel had both a blind student and a student who used a wheel chair.

There were numerous handouts, and at the end of the last session, participants, working in small brainstorming groups, wrote down and handed in their suggestions for continued diversity development in the library. Everyone filled out a personal commitment form which was not handed in but was kept by the individuals.

Forty seven evaluation forms were filled out. Attendees were asked to rate on a scale of seven (excellent) to one (poor) such qualities as the organization of the workshop, the effectiveness of the facilitators, the quality of the materials and activities, the value of the workshop to their own personal and professional development, and their overall evaluation of each session. They were asked to write a sentence or two about stronger and weaker features, about opportunities for enhancing the effectiveness of the training, and their general comments.

A majority of respondents rated every question seven or six. The highest ratings were received for the organization of the workshops (85% rated it seven or six). The next highest rating was for the overall evaluation of session two (72% sevens or sixes). Only three aspects of the workshops received any

evaluations lower than three. Two people rated the materials and activities three or one; one person rated the value of the workshop three; and two people rated the overall quality of the first session three or two.

There were numerous written and oral comments about the student panels, and many of them centered on the students with disabilities. Respondents especially liked the interaction between the participants and the panelists. They pointed out that listening to and speaking with the panelists definitely increased their sensitivity and promoted insights for interacting with people with disabilities. For example, several people commented on a blind student remarking that people sometimes raised their voices or did not identify themselves when speaking to him. This student pointed out that he also noticed when people seemed to be scurrying away to avoid him when he approached. Several respondents also stated that they heard a similar reaction from a student who used a wheelchair who said that he noticed when people seemed to try to avoid him or ignored him. Many also remarked that they were interested to learn that this same student did not mind talking about his disability. He told them he enjoys speaking to children who are not self conscious about asking him questions. When a member of the audience asked him about handicapped access, he expressed strong negative feelings to the use of the term "handicapped." All of the panelists, including international students, gay and lesbian students, members of ethnic minorities as well as students with disabilities, stressed that the attitude of those interacting with them was often more important than their actual words.

In general, people liked the interactive aspect of the workshops. There was appreciation for the small group discussions that "surfaced from interesting and well thought out activities." One person remarked on the "hit the nail on the head" approach to every issue discussed. Another commented that the sessions were geared toward "making us look at ourselves and how we stereotype others." Participants found the speakers very clear and easy to understand. Nearly everyone liked the opportunity to learn more about colleagues, for example in the stand-up-sit-down exercise. They even appreciated the occasion to learn more about their own biases. A few people did not like the role playing and felt some of the exercises reinforced differences rather than teaching respect for them. One participant worried that what the group was exposed to would not be retained or practiced after the workshops ended.

Many people expressed thanks and appreciation for the chance to take part in the diversity training workshops. At the same time, attendees wished there had been more time for discussion of what could be done to enhance awareness of diversity, which some saw for the first time as not just concerned with race and culture. One wrote, "As a largely white, middle class group, we need to understand how our assumptions can obstruct communication." Staff appreciated the personal stories, both from the facilitators and from the panelists.

The two grant directors were very pleased with the staff's reaction to the workshops. They learned that the group seemed to be genuinely interested in diversity, that skills can be learned, and that knowledge is helpful in dispelling discomfort. Their belief that participatory/active learning promotes interest proved to be correct. Further, they believe that sensitivity towards diversity is stronger in the library now than it was before, but that it must be followed up by further activities, many of which were suggested by the participants. These include periodic workshops and the setting up of a diversity committee in the library.

Phase II: Library Instruction Program

The two reference librarians directing the grant conducted special library instruction sessions for international students, students with hearing impairments, and students with visual impairments during the spring, 1995 semester. The librarians prepared new general guides to the Miller Nichols Library and new guides on how to find books and periodicals. The guides were translated into the five languages of the majority of UMKC's international students and also were printed in large type-font and in Braille. Packets were prepared for each group, with each packet containing the appropriate language version of the guides, a library glossary, a guide to using interlibrary loan, and evaluation forms to be filled out at the end of the sessions. Additional items included in the packets for students with visual impairments were the large print or Braille guides, quick reference sheets on using the adaptive workstations, on using the key pad to invoke the speech synthesizer screen reader, and on printing in large fonts.

As stated above, the goal of the library instruction was to teach those who attended how to improve their

ability to conduct library research independently. Once more, this article will concentrate on the programs for students with physical disabilities. The sessions were purposely set for a time during the semester when students would be beginning their research for term papers and class projects. All of the sessions were widely publicized. An advertisement in the university newspaper was headed, "Attention Students With Sight or Hearing Impairments," and continued, "Getting ready to write a term paper? Is it time to work on your class project?", and followed with a brief explanation of the program, times and places for the sessions, (one for hearing impaired, two for sight impaired) and where to come or a phone number to call to sign up for the sessions. Large print posters advertising the program were hung in strategic locations on campus. The librarians sent flyers to the campus office responsible for students with disabilities, and the person in charge of the office personally called several students. An article about the program was placed in UMKC Inside, a campus news publication distributed to staff and faculty, and a notice about the special library sessions was placed on the campus gopher.

The sessions for the students with sight impairments were conducted at the adaptive technology workstations. The librarians did not expect a large attendance at these sessions, but scheduled two in order to ensure that adequate attention would be given to each participant and to allow ample hands-on practice for everyone who attended. A blind student had been using the library heavily during the semester and had become very familiar with the equipment. Neither he nor a low vision student who is also a frequent library user were able to attend the sight-impairment sessions. Unfortunately, no other sight impaired students attended either, but nearly the entire reference staff of the library came to one or the other of these two sessions. The librarian instructor demonstrated each workstation separately. For the workstation intended to be used by blind students, she showed the attendees how to scan, read, and save a document, how to print a document in Braille, how to get into their campus e-mail accounts and the university's OPAC and online periodical indexes. She also demonstrated how to gain access to WordPerfect, the word processing application available on the workstation, and how to use the key pad to invoke the voice synthesizer screen reader. For the second workstation, intended primarily for students with low vision, she demonstrated how to manipulate the screen in order to read information in large print, how to use some of the reference sources such as a general encyclopedia, and how to print in large type fonts. Several participants took the opportunity to try out some of the applications taught. In their evaluations, staff stated they felt much more comfortable about helping others to use the equipment after the meeting. This was an important, but unexpected, accomplishment of these sessions.

A sign language interpreter was hired to sign the librarian's presentation at the session for hearing impaired students. One student with hearing impairments and seven members of the reference staff attended the session. The librarian- instructor discussed the information included in the "Guide to the Library" handout, including how to locate and check out materials and how to utilize interlibrary loan and other services. She showed the group how to design a research strategy, focus on a topic, choose terms and concepts, and gather information by looking at specialized reference sources, and search for books and articles using various paper and automated indexes. The hearing-impaired student was given the opportunity to try out some of the tools herself. The interpreter and librarian worked well together, the student asked several questions of the interpreter, and the staff benefitted from watching the interaction among the three. Again, evaluations were favorable.

To fulfill the third objective of the diversity grant, enhancing the library's collection to better serve persons with physical disabilities, the library purchased several large print reference books which could be used by people with limited vision such as encyclopedias, dictionaries, a thesaurus, and a health manual. Those published in a CD-ROM format were placed on the large print workstation.

PLANS FOR THE FUTURE

For the coming academic year, the library is continuing the funding commitment to enhance the library instruction program for students with disabilities. A proposal was funded by the Student Computing Fee Committee to upgrade the equipment for use by those with visual impairments. The demonstrations showed that the current equipment is somewhat awkward to use, and it is hoped that the new equipment and software will be more user friendly. The library will continue to focus its efforts primarily on providing equipment for students with visual impairments, but also plans to provide some adaptive equipment which will make it easier for patrons with motor impairments to use the workstations. The

School of Education has a lab, accessible to all students, with assistive technology equipment geared to help those with motor disabilities and is the primary source for such equipment on campus. The Reference Department visited this lab recently to meet the staff and familiarize themselves with the resources available there. This will allow library staff to make knowledgeable referrals to library patrons who might need the resources of this lab.

The Miller Nichols Library will continue to concentrate its efforts on helping patrons with disabilities take advantage of the library resources available to all library users. Instead of just the two librarians who received the grant conducting library instruction for patrons with disabilities, the entire reference staff will join in the training. The sessions will be held during the Fall, 1995 semester when many students are new to the university, and it is hoped that with early publicity, these sessions will be better attended than were the ones in the spring. At the same time, the entire reference staff looks forward with renewed confidence to working one-on-one with students with disabilities.

Return to itdv02n4 Contents Page

Return to Journal Volumes Page

THE AD-A-P-T-A-B-L-E APPROACH: PLANNING ACCESSIBLE LIBRARIES

Copyright by Alan Cantor 1995.

Alan Cantor
32 Queensdale Avenue
Toronto, Ontario
M4J 1X9
phone/fax: (416) 406-5098

THE PROBLEM: A SURFEIT OF TECHNOLOGICAL CHOICE

On the road to making libraries more accessible to people with disabilities, librarians often get stuck in technological mud. The choices are overwhelming, and many librarians feel they lack the technical expertise to select appropriate equipment. They have many questions about assistive technologies (AT): Should we buy a monochrome or colour CCTV (Close Circuit Television)? Which scanner works best? Can scanning software be used independently by someone who relies on synthesized speech output? How much RAM (Random Access Memory) and how large a hard drive are needed to run assistive technologies? What size monitor is optimal for for screen enlargement software? Is the screen enlargement program compatible with the voice output program? Do we need a Braille printer? a refreshable Braille display? a personal transmitter/receiver system? If yes, FM or infrared? And what about a voice recognition system?

It is perfectly understandable that many librarians become confused by the surfeit of technological choices. AT is a vast, constantly changing field. Keeping abreast of AT trends is a full-time job that many librarians have neither time nor inclination to take on.

Technological paralysis had already set in at the Ontario Ministry of Labour when I was asked to help choose assistive devices. In early 1995 the library received funding to make its collections and facilities more accessible to persons with disabilities. The three members of the project team spent a month meeting ministry employees with disabilities and combing the literature on AT. They amassed a fabulous collection of books, journal articles, pamphlets and promotional materials. When I met the team for the first time, I was impressed by their knowledge of assistive technologies, and by the fact that they had realistic expectations of what was achievable. But when it came down to choosing the equipment, the team was stumped. They simply did not know how to decide.

This article is intended as an antidote to technological paralysis. It is practical guide for librarians who are overwhelmed by AT. I describe an approach for choosing accessibility aids that puts high-technology devices into a broader context. I call the approach AD-A-P-T-A-B-L-E, an acronym formed of the first letter of eight distinct workplace accommodation strategies:

- Assistive
- Devices
- Alternative formats
- Personal support
- Transportation services
- Adapted furniture
- Building modifications

- Low-tech devices
- Environmental adaptations

The ADAPTABLE approach stresses that there are many ways to accommodate people with disabilities, most of which do not involve high-technology. ADAPTABLE implies that one should strike a balance among the various accommodation techniques. Emphasizing high-tech approaches at the expense of the other seven categories jeopardizes the goal of ensuring equal access. When embarking on a project to enhance library accessibility, selecting a broad spectrum of accommodations guarantees that the needs of the majority are more likely to be met. Following a description of the ADAPTABLE approach, this article presents eight strategies for choosing access aids for the library, and concludes with some thoughts about the potential role high-technology might play in creating a more equitable society.

THE ADAPTABLE APPROACH TO WORKPLACE ACCOMMODATIONS

As a workplace accommodation consultant, I am responsible for devising and implemeting alternative ways for individuals to work and study. Workplace accommodation planning is a form of creative problem solving. There are no recipes for success; each individual's accommodation needs are unique. People having the same functional abilities often demand different access techniques. For example, a person who is legally blind might prefer to study literature by (1) listening to a synthesized voice; (2) reading Braille; (3) using an illuminated magnifying glass; (4) using a CCTV; (5) reading large-print on paper; (6) reading large-print on a computer screen; (7) listening to books-on-tape; (8) being read to by another person; or (9) a combination of the above.

When developing an accommodation plan, I work closely with the individual to generate as many accommodation options as possible. To spark our imaginations I present the client with ten or more distinct accommodation approaches. Eight of the approaches are relevant to planning accessible libraries:

1. Assistive Devices: High-technology apparatus, usually (but not always) computer-based, that extends a person's sensory and/or bodily powers: text enlarging software; reading machines; voice activated computers; adapted keyboards and pointing devices; hearing aids; environmental control units.

2. Alternative formats (or Communication Services): Print-materials presented on cassette or on computer disk, in Braille or in large-print; real-time captioning at meetings; captioned videocassettes

3. Personal support (or Human Support Services): Readers; personal care attendants; sign language and oral interpreters.

4. Transportation services: This accommodation strategy refers to various means to bring people to the library, or alternatively, to bring the library to the people. Examples include book delivery and bookmobile services; bus and taxi service provision.

5. Adapted furniture (or Workstation Modifications): Wheelchair accessible desks; adjustable office chairs; articulating monitor arms; keyboard trays and other computer accessories.

6. Building modifications: Wheelchair ramps; lowered elevator control panels; automatic doors; retrofitted bathrooms; high-visibility signage; visual notification systems.

7. Low-tech devices: Book holders; magnifying glass; tape recorders; ladders; easy-to-grip pens.

8. Environmental adaptations: Special lighting; quiet zones; climate controlled areas; air purifiers.

ADAPTABLE TIPS: PLANNING ACCESSIBLE LIBRARIES

Beginning the process

When beginning the process of enhancing library accessibility, consider the following preliminary steps:

1. Tour accessible libraries. Visit people who have set up and manage accessible library facilities. Our project team met several librarians, all of whom were happy to make suggestions and share their insights.

2. Ask persons with disabilities to suggest accessibility aids for the library. Ask library patrons which assistive devices they prefer, which low-tech devices are most helpful to them, and what kinds of human support services the library should consider. By talking with computer users who are blind, I learned which synthetic speech program, scanning software, and Braille translation software were generally favoured. They also told me about the limitations of Windows-based screen reader programs and the advantages of a particular flatbed scanner. Further, I learned how important is can be to provide simple, inexpensive items like a good desk lamp and a lightweight, hand-held magnifier.

3. Ask your staff for suggestions on making the library facilities more accessible to them. During one of my visits to the Ministry of Labour library, I learned that several staff members over 40 years of age had difficulties reading the call numbers on book spines. To remedy the problem, I suggested that a larger, darker typeface be used in the future; and that a plan be drawn up to replace the old labels with "large-print" labels.

Applying the ADAPTABLE approach

The following suggestions are based on my recommendations to the Ministry of Labour library. I allotted approximately 70-75% of our accessibility budget toward the purchase of high-technology devices -- computer upgrades, a reading machine, a scanner, a speech synthesizer card, and the like; and 25-30% toward adjustable furniture, hand-held magnifiers, book holders, a walker, a wheelchair, training, and so on.

Prices are given in Canadian dollars. (At the time of writing, US $1.00 buys Can $1.40.)

1. Assistive Devices

Acquire big tower cases for computers. A computer in a roomy box is easier to maintain and upgrade. Use several computers to house assistive technologies. Do not install all computer-based assistive devices on a single computer. Computers packed with assistive technologies are difficult to configure. Use several computers, and limit the number of assistive devices to two or three per computer. (Note: Some products are designed to work together, such as a speech synthesizer and screen enlargement program made by the same manufacturer.)

Shop around for the best prices: The cost of assistive technologies and computers varies from dealer to dealer. Differences of $100 - $150 per item are common. For one item, price quotes ranged from $483 to $885 -- a spread of over $400! By shopping around, I saved 8-10% of the total equipment budget, or about $2000. Get an extended warranty on computers. Expect hardware problems during the first year or two after purchasing a computer. Buy from a retailer who guarantees their computers for at least two years (parts and labour).

Negotiate the price of configuring the computer before buying. If you lack the ability to configure a computer system, ask the vendor of the assistive devices to do it. Some retailers will configure a system for free; others charge a modest sum. Tell the vendor exactly which peripherals and programs you expect to run on each computer.

Back up the hard drive: The hard drive of public access computers are often deleted or reformatted. To protect against accidental or deliberate data loss, back up your computers as soon as they are configured. I recommend buying tape backup units to streamline the task of backing-up and reloading the computers.

Reserve funds for repairs of computer-based assistive devices. Mechanisms with many moving parts,

such as refreshable Braille displays, are especially prone to breakdowns.

2. Alternative formats (or Communication Services)

Use existing resources creatively: Your library probably already has equipment that can be used to produce large-print documents, e.g., an enlarging photocopier and a laser printer.

Create brailled key-cap covers: Apply adhesive-backed Braille labels to the keyboard. The key-caps help to orient blind computer users to an unfamiliar keyboard. Although key caps can be placed on all keys, they usually are affixed only to keys that are used to control access software. Let your patrons guide you in placing key-cap covers.

To produce key-caps, use a special Dymo Braille tape-writer. Dymo also makes a large-print label maker. Each model costs about $80. Dymo products are available from organizations that support persons with low-vision or who are blind.

Produce or buy large-print key-caps: You can make large-print key-caps yourself with a Dymo large-print tape-writer, or they may be purchased ready-made. The key-caps come in various colours, and cost about $40 a set. Large-print key-caps are also available from organizations that support persons with low-vision.

3. Personal support (or Human Support Services)

Train librarians to serve people with disabilities: Library staff may not possess the skills to communicate and interact with patrons with disabilities. At least a few staff should learn American Sign Language and the skills to guide a person who is blind. Staff development is an important element in making a library more accessible to persons with disabilities.

4. Transportation services

Provide book pick-up and delivery services for people who cannot get to the library building. Such a service is valuable for people who are terminally-ill or whose mobility prevents them from using the library facilities.

5. Adapted furniture (or Workstation Modifications)

Provide adjustable chairs. For many people who have back problems, seating comfort is contingent on them having an adjustable chair. The best value in adjustable seating is the so-called "ergonomic" office chair.(1)

Look for a chair with these eight features:

1. Adjustable seat height
2. Swivelling seat
3. Adjustable seat angle
4. Rolling casters
5. Adjustable back height
6. Stable base of five legs
7. Adjustable back angle
8. Padded seat with rounded front edge

Adjustable chairs are sold at office and ergonomic supply stores, and each can cost up to $500.

Get proper computer workstations. People with disabilities are especially prone to computer overuse injuries (RSI -- repetitive strain injuries). (2) When a computer keyboard is placed on a regular desk or library table, most people are forced into biomechanically hazardous typing postures.

Look for wheelchair-accessible computer tables. All computer tables should have, at minimum, adjustable keyboard and monitor shelves.

6. Building modifications

Budget for building modifications: Even libraries that have wheelchair ramps and electronic doors may lack these amenities:

A. A wheelchair-accessible drinking fountain.

B. A unisex, wheelchair-accessible toilet is convenient for a patron whose personal attendant is of the opposite sex.

C. Emergency notification system. This device connects to the main fire panel. In case of emergency, warning lights flash to signal an evacuation. Information about notification systems are available from your local hearing society.

7. Low-tech devices

Build a collection of low-tech devices. The activities of daily living are greatly enhanced by well-designed tools. For example:

Book holders. Office supply stories sell metal book holders for a few dollars each. Book holders are indispensable for persons with upper-body mobility difficulties.

Magnifiers. There are magnifiers that are held in the hand, rest on the desk top, or clamp to the edge of a piece of furniture. Magnifiers are sold at some office supply stores and at stores that specialize in aids for people who are blind or who have low-vision. I found a 6.5 inch rectangular bar magnifier with a handle for $4; a hand-held, illuminated, 10 x 5 cm, 2x magnifier for $27, and a table-top, 60 mm diameter, 4x magnifier on a goose-neck for under $100.

Perkins Braillers. A Perkins Brailler is a sturdy, seven-keyed typewriter that embosses Braille on paper. Expensive when purchased new, a Brailler can be bought second-hand and/or reconditioned. Perkins Braillers were popular items in every accessible library I visited. Special paper for the Brailler costs about $15 for 250 sheets.

Cassette recorder. A tape recorder works as a note-taking machine for people who cannot use their hands, are blind, or have certain learning disabilities. A basic model with voice-activated microphone costs about $50.

Telephone aids. If your library has a public telephone, consider exchanging it for a model with volume control, a speakerphone and/or a headset.

Manual wheelchair. Not every person who uses a wheelchair needs it all the time. Many individuals use a wheelchair only after they tire. Medical and hospital supply stores sell used, manual wheelchairs for a few hundred dollars.

Walker with a hanging bin for books. Like a wheelchair, a walker helps a person whose energy is ebbing to continue on with their activities. A hanging bin for the walker is a convenient place to carry books. Medical and hospital supply stores sell used walkers for about $125.

8. Environmental adaptations:

Provide desk lamps. Many people who have partial sight benefit from having a good light source. A desk lamp with a goose-neck head may be bought for under $10.

IV. Conclusion: High-tech in perspective

At the 1995 CSUN Technology and Persons with Disabilities Conference in Los Angeles, I heard speaker after speaker sing the praises of high technology. At moments I felt I was surrounded by a great chorus chanting variations of a single theme: "Computers are empowering tools; they bestow unprecedented power on those who master them..." or "High technology is breaking down the barriers... closing the gap... levelling the playing field, etc." I am deeply troubled by this perspective, for I do not see how any technology can be held responsible for effecting social change. Technologies do not cause social change; technologies only make social change possible.

I believe that as a society, we are easily mesmerized by the promises of high technology. Computer-based technologies, in particular, are so quick and responsive that they appear almost alive. Notwithstanding our culture's fascination with high-tech, equity workers must not lose sight of our ultimate goal: to create a social climate in which all people are treated fairly and have equal opportunities. There is still much work to be done before it can be claimed that microcomputer-based technologies have ushered in a golden age and introduced an equitable social order.

We must not confuse means with ends. I believe that for some workers in the accessibility field, technology has become an end rather than a means. But the goal is not assistive technology; the goal is accessibility. This confusion of means and ends is observable in the policies of vocational rehabilitation programs that fund assistive devices for individuals, but refuse to pay for appropriate workstations, training or human support services. Underlying this practice is the belief that technology equals access, and that access automatically bestows social power. I promote the ADAPTABLE approach as a way to show that these equations are wrong. Applying the ADAPTABLE principles means providing a balanced approach to workplace (and library) accessibility.

The accessibility of your library will not be judged by the sophistication of the technologies you have, but the comprehensiveness of the services you offer. In this article, I have argued that high-tech accommodations represent but one route on the long road to a more equitable society.

NOTES

1. No piece of furniture is ergonomic unless it is adjusted and used properly. An adjustable chair encourages, but does not guarantee healthy posture.

2. Cantor, Alan. (March 1995). "Repetitive Strain Injuries (RSIs) at the adapted keyboard: preventing computer overuse injuries in persons with disabilities." CSUN 1995 Conference Proceedings. Los Angeles, CA. See also Augmentative Communication News, March-April 1995, Vol. 8, No. 2. The issue is devoted to RSI concerns in persons who rely on augmentative communication devices.

Return to itdv02n4 Contents Page

Return to Journal Volumes Page

THE RISE OF THE GRAPHICAL USER INTERFACE

Alistair D. N. Edwards

Department of Computer Science
University of York
York
England
YO1 5DD
email: alistair@minster.york.ac.uk

INTRODUCTION

One of the most important developments in information technology over the past ten years or so - quite apart from the massive improvements in hardware technology - has been the graphical user interface (GUI). For most people it has been a positive innovation, but for some - particularly those who are blind or visually impaired - it has been a rising threat as a barrier to the technology. Now that such interfaces have matured and become the norm, adaptations have been developed and perhaps that threat is not as bad as it was once feared to be. This paper describes the development of the GUI, why it is so significant and discusses whether it has been "tamed" with respect to use by people with visual disabilities.

The advent of the microcomputer had a profound effect on information technology. Now that computers were being mass produced, the more units that could be sold the cheaper they would be - and the cheaper they were the more people could afford to buy them. Cost, however, is not the only barrier to the purchase of computers -- they also had to be usable. So it was effectively with the advent of the microcomputer in the early 1980's that the discipline of human-computer interaction (HCI) became established.

Undoubtedly the greatest innovation in the field of HCI has been the adoption of the graphical user interface (GUI). For the vast majority of new users the graphical user interface is much more usable than anything that has gone before - as long as they can see the screen. The fundamental problem is that sight is very efficient. This is often summarized (somewhat loosely) by saying that sight has a very broad bandwidth; what sight can do is take in a lot of information and furthermore it has control over that information flow, allowing the person to focus on what is important and filter out that which is not. Much of the power of GUIs comes from the fact that they make the most of this ability; they present a lot of information on the screen but can rely on the power of sight to cope with all of it. None of the non-visual senses has that same power, that bandwidth.

ORIGINS OF THE GUI

The reasons why GUIs are easier to use are many and have been explored and documented in many research papers and books. (Chapter 4 of Dix, Finlay et al., 1993 includes a discussion). To most sighted users the question never arises. Most people who have tried a GUI have found it much easier to use than the alternatives. (The general exception to this is expert users of traditional interfaces who often find GUIs limiting and long-winded). The components of the interface similarly need no description to sighted people, they can simply be shown them. For people who can never have the experience of seeing or using a GUI the concepts are difficult to describe, but anyone who needs such a description might consult Morley (1995).

The history of graphical user interfaces (GUIs) goes back to the 1970s. Project Smalltalk was established at Xerox Palo Alto Research Center (Parc) which attempted to look into the future. The idea was to assume that in the future computing power would be abundant and inexpensive. How could the best use be made of the power available? Two influential developments resulted: object-oriented programming and the graphical user interface. Much of the inspiration behind the GUI came from Alan Kay's vision of the "Dynabook" - a powerful, easy-to-use computer which would be a portable and ubiquitous source of

information, a vision which is almost frighteningly familiar in this age of laptops and personal organizers.

The Star GUI was implemented on the Alto system and included most of the elements that are so familiar today: windows, icons, menus, etc. (Smith, Irby et al, 1982). This was still a development project and it was Apple who went on to commercialize the ideas. The story is that Steve Jobs, one of the co-founders of Apple, was invited down the road from Cupertino to Palo Alto to see what was going on at Parc. There he saw Star and was immediately struck by its possibilities. He went back to Apple determined that the next generation of machines they would market would have the same style of user interface as the one he had seen at Xerox.

Jobs proceeded to hire many of the developers from Xerox, including Alan Kay, who used their expertise to design the new Apple system. The first incarnation was the Lisa (named after Jobs' secretary). This was for its time a very powerful microcomputer and had a graphical user interface. The Lisa was not a commercial success, but Jobs was unperturbed and went on to develop the Macintosh (Macintosh being his favourite variety of apple).

The Macintosh was released in 1984. It consisted of a keyboard and mouse attached to a box which contained a 9-inch monochrome screen and a single floppy disc drive. The basic version had 128 kbyte of RAM, though the "Big" Mac was available with 512 kbyte. For its time it was under-powered and over-priced, compared to available PC clones. What it had that was different was its user interface. At that time the style of interface was usually referred to as "Wimp," derived from the components "window, icon, menus and pointer," but that term seemed to die out due to its negative connotations and was replaced by GUI - or even "gooie."

FIRST ATTEMPTS TO TACKLE THE GUI PROBLEM

In 1984 I was researching for my Ph.D. at the Open University in England. Tom Vincent was a member of the university who had already done a lot of work on making computers accessible to blind people, mainly through the use of speech synthesizers. He had already recognized the potential problem posed by the increasingly visual nature of user interfaces and, having talked to him, I made a major shift in my research direction (from computer-aided learning) and started out to tackle the GUI. At that time many people saw the Macintosh as a passing fad. They believed it was all very well as a means of making word processing easier for secretaries, but "real" computer users would never want to mess around with mice and menus and all those gimmicks. In the same manner, many blind computer users did not see any threat. They thought that command-line interfaces, such as MS-DOS and Unix would always predominate. Some of us thought they were wrong - but it was hard to find corroboration. Eventually I was able to find a quote to include in my thesis from a not-well-known futurist, Zachmann (1987): "The future lies with a graphical windowing interface, mouse cursor control, pull-down menus, dialog boxes, and the like" and that computers based on such interfaces "are destined to take over the IBM PC and compatible world as well." (pp. 13-14).

Scadden (1984) was one of the first to recognize the potential threat: "If such visually-oriented computer equipment were to become dominant in the microcomputer marketplace, blind and visually impaired people would lose much of the newly acquired equality unless... alternative approaches were available (p. 399)."

My approach was to make the adaptation entirely in software. I concentrated on the use of sounds (speech and non-speech) and on making the mouse usable in a non-visual interaction. I realized that the ultimate requirement would be for screen-reader-like adaptations, which would adapt a variety of applications, but for the present I tackled the simpler problem of writing one particular application, a word processor. The result was Soundtrack. To the best of my knowledge Soundtrack was the first program which embodied the essential characteristics of a graphical user interface which was usable by blind people and it is still one of the few which can be used through a mouse.

Soundtrack had an unconventional screen layout which consisted of eight "auditory windows." Each window had a sound associated with it which was heard as the cursor was moved into that window. The

sounds were arranged according to their musical pitch. The windows had names too, and the name could be elicited (in synthetic speech) by pressing the mouse button within the window. Each window had a particular role; four of them corresponded to menus, for instance. A second level of interaction was reached by double-clicking the mouse. That would cause the current window to become subdivided into a number of components (auditory items). Each of those had a sound and a name, just as the windows had, as well as an action, which was performed if the user double-clicked the item.

Further details of Soundtrack can be found in Edwards (1987) and Edwards (1989). It was never intended to compete with other word processors, it was only a research vehicle. Copies were made available and feedback was invited, but I do not believe anybody took to using it regularly. Nevertheless, it achieved its objective of demonstrating one way of making a GUI accessible through the fairly extensive evaluation I carried out. As a piece of academic research I was bound to be candid about its weaknesses and I think it is a bit unfortunate that it was the weaknesses that people picked up on. Soundtrack did demonstrate that mouse-based interactions could be transformed into a non-visual form. The main problem with using it was that it imposed an extra load on the user's memory. For instance, whereas most of my evaluators could easily remember that the delete command in their word processor was Ctrl-X (or whatever), they now had to remember that the Cut command was in the Edit menu and the Edit menu was the second one on the top row, and so on.

I and colleagues at the University of York took this work a little further, continuing to investigate ways of using sounds to guide a blind user through a two-dimensional space with a mouse. That work is written up in Pitt and Edwards (1991) and Pitt and Edwards (1995). Apart from that, our research has moved off in other directions and we have left others to continue with the GUI problem - as described below.

DEVELOPMENT OF ADAPTATIONS

The first commercial Macintosh adaptation was released in 1988. That was Outspoken, from Berkeley Systems Inc. It maintained the screen reader style of adaptation in that it worked with a variety of applications (though sadly not all - mainly for technical reasons). The designers took a different approach from that of Soundtrack in that they got around the need to use the mouse. The basic idea is that whatever the cursor is pointing to on the screen is spoken out. One can move the cursor using the mouse in the usual way, but when working non-visually and relying on the speech output that is not really feasible. Therefore alternative control of the cursor is available through the keypad. For instance, four keys are used to move the cursor up, down, left and right (8, 2, 4 and 6 respectively). Other keys have other roles, so that the 5 key corresponds to the mouse button, another takes the cursor directly to the menu bar and so on.

The developers of Outspoken performed a remarkable job since they delved around in the operating system and succeeded in extracting all sorts of information not intended to be accessible to other software. Unfortunately not all the information required to make a good adaptation was accessible. A simple example is "greyed-out" ("disabled" in the language used in Morley, 1995) menu entries. Commands which are currently inappropriate cannot be selected and this is signified by their being displayed in a grey colour. For instance, in a word processor with no document open, the CLOSE command cannot do anything and would be greyed out. However, the fact that a menu item is grey is not accessible to Outspoken and so is read out in the same manner as a black, active item. Thus such an item can apparently be selected and there is often no indication to the user that the command has had no effect. Further critical evaluation of Outspoken can be found in Edwards (1991) and Edwards (1995). So, Outspoken was important historically and technically as the first screen reader for a GUI but its effect in terms of increasing accessibility has been limited.

The Macintosh was the first widely available GUI and Outspoken the first non-visual adaptation. Meanwhile in the PC world there were various attempts to promote graphical interfaces. It was not until Microsoft, the originators of DOS, released their Windows interface that things really started to change. Slowly the market has drifted from people running the majority of their applications under DOS to the situation where Windows has taken over as the default. As that has happened the community of blind computer users has begun to take notice - and to worry.

There have been a number of responses. Commercial developers have produced adaptations. The first to appear on the market was Window Bridge from Syntha-Voice in Canada. There has also been a considerable amount of research into solving the problem.

In 1991, the European Commission established the TIDE initiative (Technology for the Integration of Disabled and Elderly people). One of the first projects it funded was GUIB (Graphical and textual User Interfaces for Blind people). As with all such projects, this was an international collaboration involving partners in several European countries.

The initial approach of GUIB was to investigate the use of a variety of input and output media. For output there was an extensive Braille display (some 200 Braille cells in all), three-dimensional sounds, and speech. For input there was the keyboard, a touch-sensitive pad, routing keys associated with the Braille cells and other cursor keys on the Braille display. (Further details can be found in Crispen and Petrie, 1993). GUIB progressed into the second round (Bridging Phase) of the TIDE initiative and eventually resulted in the Windots screen reader which is now commercially available from Papenmeier. Windots relies on the use of a Braille display (though a more conventional 80-cell one) but a speech-only version is also due for release.

The original philosophy behind GUIB acknowledged the bandwidth problem, mentioned earlier. If no one of the non-visual communication channels has the same capacity as the visual one being replaced, then perhaps several in combination will substitute more effectively. However, in the end, other considerations such as cost have led to the release of versions of the GUIB screen reader which use a single channel (speech or Braille). I fear their usability will not match that of the development prototype.

IBM's newest personal operating system is OS/2, written for its PS/2 range and has a graphical user interface. A screen reader was developed to work with it. IBM came up with the name Screen Reader to describe this product - and trademarked it. Screen Reader is something which grew out of a student project and for long enough was not intended to be a commercial product. The advantage that Screen Reader's developers had over third party adapters of other systems was that they had access to the code for the operating system - and the people developing that code. This meant that they were able to find out exactly how to access the system information and even request hooks to be inserted in future releases to facilitate their access. Descriptions of Screen Reader and its development can be found in Schwerdtfeger (1991) and Thatcher (1994). OS/2 never seems to have challenged Microsoft's operating systems in the marketplace and the number of Screen Reader users is small - though as Windows can be run within OS/2 this can be another means of accessing Windows.

Another GUI which has grown in popularity, X-Windows, runs on Unix systems. This originated from the Massachusetts Institute of Technology (MIT) and as such developed in a very open manner. Administration of the development of X has been taken over by the X-Consortium which has been an important factor in getting X made accessible. Beth Mynatt and her colleagues at Georgia Tech have tackled the accessibility of X through their Mercator screen reader. It has been most important that they have been able to collaborate with the X-Consortium. This has meant that the Mercator developers have been able to specify extensions to the X software onto which screen-reader-like adaptations can be hooked. Those extensions are part of the standard release of X. In other words, the hooks are irrelevant to most X users and not used by most X software developers. However, the creator of an adaptation can use those hooks to make other software accessible.

Given this level of access to the system, the developers of Mercator have been able to build a well structured interface. Access is based on a hierarchical structure imposed on the interface components. In this way the spatial layout of visual components is irrelevant and replaced by a logical structure. "Natural" non-speech sounds are used to give contextual information to the user. For instance, on entering a field into which text can be typed the user hears a typewriter noise. Synthetic speech is used to read out textual information. Mynatt and Weber (1994) describes the approach taken in Mercator, and contrasts it with that of GUIB.

VISUALLY IMPAIRED USERS

As often seems to be the case within information technology, the needs of visually impaired (i.e. partially sighted) users seems to have come further down the list of priorities. To some extent the basic problem is the same: the lack of bandwidth - but in the visual channel.

In addition to Outspoken, Berkeley Systems produced a screen enlarger for the Macintosh, called Inlarge. Shortly afterwards Apple bought the rights to a simplified version they called CloseView and for a time it was shipped as a standard part of the Macintosh system.

The most concerted effort to address the needs of visually impaired GUI users was the Unwindows Project, which was funded by the NSF (Kline and Glinert, 1995). This adaptation of X-Windows performs two functions of particular help to those with restricted vision: selective magnification of areas of the screen so that the contents can be seen comfortably, and keeping track of the location of the mouse pointer.

CONCLUSIONS

All of the above developments have followed the same progression in that a visual GUI has been developed and then at some later time someone else has thought about the needs of users with visual disabilities and some form of adaptation has been added on to the existing interface. To some extent the success of the adaptation has depended on the level of access to the existing visual software. Microsoft's Windows is the most used GUI and it is with the new release of this software, Windows 95, that possibly the greatest innovation will occur.

Having been seen as an adversary by many visually disabled people, Microsoft appears to have gone through a dramatic change of heart and is expending effort on ensuring that Windows 95 will be adaptable to the needs of visually disabled users. Right from its first release, Windows 95 will include an off-screen model which software developers will be able to use as the basis of non-visual representations of the screen.

This paper is about history, so it is probably inappropriate to speculate in it too much about the future. There are a range of GUI adaptations available and the change in attitude and software at Microsoft will probably prove to be significant. So it might be tempting to believe that the GUI problem is solved. However, I would caution that we should not get carried away yet.

GUIs are effective because they make the most of this capacity of sight and the problem of adapting them is due mainly to the fact that the other senses simply do not have that capacity. The limitation of the current adaptations is that they tend to use just one of the non-visual channels of communication.

In most cases they rely almost entirely on speech communication - supplemented to some extent by non-speech sounds. It seems unlikely that such a restricted channel can ever be a substitute for the richness of vision.

It is a shame that the original principle of the GUIB Project of using as many channels as possible was not followed through in terms of the commercial products which emerged. But on a positive note, Microsoft's approach of not supplying adaptations but providing the facilities whereby third parties can develop them might bear fruit. Assuming the off-screen model is sufficiently rich, multi-modal adaptations will be developed and I would expect it to be these which will be most successful and usable.

Manufacturers

Berkeley Systems Inc.
1700 Shattuck Avenue
Berkeley
California
94709

Syntha-voice Computers Inc.
Suite 304
800 Queenston Road
Stony Brook
Ontario
Canada
L8G 1A7

F. H. Papenmeier GmbH & Co. KG
PO Box 1620
2 Talwegstrasse
Schwerte
Nordrhein-Westfalen
Germany
D-58211

References

Crispen, K. and Petrie, H. (1993). Providing access to GUIs for blind people. in Proceedings of 19th Convention of the Audio Engineering Society.

Dix, A., Finlay, J., Abowd, G. and Beale, R. (1993). Human-Computer Interaction., London: Prentice-Hall.

Edwards, A. D. N. (1987). Adapting user interfaces for visually disabled users. unpublished Ph.D. thesis, the Open University.

Edwards, A. D. N. (1989). Soundtrack: An auditory interface for blind users. Human-Computer Interaction 4(1): pp. 45-66.

Edwards, A. D. N. (1991). Evaluation of Outspoken software for blind users. University of York, Department of Computer Science.

Edwards, A. D. N. (1995). Outspoken software for blind users. in A. D. N. Edwards (ed.) Extra-Ordinary Human-Computer Interaction. New York, Cambridge University Press.

Kline, R. L. and Glinert, E. P. (1995). Improving GUI accessibility for people with low vision. in I. R. Katz et al, (eds.) Proceedings of Chi '95: Human Factors in Computing Systems, Denver, ACM. pp. 114-121

Morley, S. (1995). Window Concepts: An Introductory Guide for Visually Disabled Users. Edition, London: Royal National Institute for the Blind.

Mynatt, E. D. and Weber, G. (1994). Nonvisual presentation of graphical user interfaces: contrasting two approaches. in C. Plaisant (ed.), Proceedings of Chi'94: Celebrating Interdependence, Boston, ACM Press. pp. 166-172

Pitt, I. J. and Edwards, A. D. N. (1991). Navigating the Interface by Sound for Blind Users. People and Computers VI: Proceedings of HCI '91. Cambridge, Cambridge University Press. D. Diaper and N. Hammond (eds.) pp. 373-383.

P.. I. J. and Edwards, A. D. N. (in press). Pointing in an Auditory Interface for Blind Users. to appear in Proceedings of the IEEE Conference on Systems, Man and Cybernetics, Vancouver (October 1995).

Scadden, L. (1984). Blindness in the information age: Equality or irony? Journal of Visual Impairment and Blindness 78: pp. 394-400.

Schwerdtfeger, R. (1991). Making the GUI Talk. Byte Magazine (December): pp. 118-128.

Smith, D.C., Irby, C., Kimball, R., Verplank, B., and Harslem, E. (1982) Designing the Star user interface, Byte, April, pp. 242-282.

Thatcher, J. (1994). Access to OS/2 and the graphical user interface. in Proceedings of Assets '94, Los Angeles, ACM. pp. 39-46

Zachmann, W. F. (1987). A look into the near future - 13 predictions for the world's computer industry. International Data Corporation.

Return to itdv02n4 Contents Page

Return to Journal Volumes Page

UNIVERSAL ACCESS AND THE ADA: A DISABILITY ACCESS DESIGN SPECIFICATION FOR THE NEW UCLA LIBRARY ON-LINE INFORMATION SYSTEM

Daniel Hilton Chalfen, Ph.D.
UCLA Office of Academic Computing,
Disabilities and Computing Program

Sharon E. Farb
UCLA Library

INTRODUCTION

The time-honored, fundamental mission of American libraries is to provide universal access to information, collections, materials and services. In passing the Americans with Disabilities Act of 1990 (the "ADA"), Congress estimated that over 43 million Americans have one or more disabilities. Congress further noted that, historically, society has tended to isolate and segregate individuals with disabilities, and, despite some improvements, such forms of discrimination against individuals with disabilities continue to be a serious and pervasive social problem. 42 USC Section 12101 (a) (5) provides that "individuals with disabilities continually encounter various forms of discrimination, including outright intentional exclusion, the discriminatory effects of architectural, transportation, and communication barriers, overprotective rules and policies, failure to make modifications to existing facilities and practices, exclusionary qualification standards and criteria, segregation, and relegation to lesser services, programs, activities, benefits, jobs, or other opportunities."

Individuals with disabilities comprise every demographic group imaginable. Thus, regardless of library type or location, individuals with disabilities represent an identifiable component of the constituency a library serves. However, it is well known that persons with disabilities have historically been underserved by libraries. The compliance obligations imposed upon libraries by the Americans with Disabilities Act of 1990 (ADA) present an opportunity to improve access not only to a traditionally under- served community, people with disabilities, but to all library users.

This article provides: (1) a brief discussion of the barriers traditionally faced by people with disabilities in accessing library collections, materials and services, (2) ADA compliance requirements for libraries, (3) an overview of the importance of adaptive computing technology in making library information accessible, and (4) a disability access design specification for the new UCLA library on-line information system, with the flexibility needed to adapt to a library's changing needs in providing universal information access. The specification includes extensive references for system design guidelines.

Library Access Barriers for People with Disabilities

Absent the ADA, the physical layout of the traditionally constructed library presents substantial access barriers to many people with disabilities. Most library construction prior to the ADA did not contemplate the particular problems of access experienced by people with disabilities. While it is difficult to generalize as to all disabilities, even a quick glance around the typical library will reveal some of the most common barriers to access, including: (1) entrances and doors that are too narrow to accommodate wheelchairs; (2) door hardware requiring substantial pressure, which is difficult for someone with limited upper body mobility to operate; (3) floors that are inaccessible to people in wheelchairs (i.e. stairways only, no elevators); (4) furniture that is not adjustable so that a variety of users, including those in wheelchairs, can be accommodated; and (5) book stacks, card catalogs and on-line searching stations that cannot be reached by a person in a wheelchair or with upper body dexterity limitations, (6) on-line information that is not accessible to people with print impairments due to lack of computer accommodation. The presence of these access barriers can greatly, and unnecessarily, increase the difficulty of accomplishing research for a person with a disability. Fortunately, as detailed below, the ADA now provides general guidance for libraries in identifying and

eliminating these access barriers.

THE REQUIREMENTS OF THE ADA

The ADA prohibits discrimination against persons with disabilities in the areas of employment, public accommodations, state and local governmental services, transportation, and telecommunications. Pursuant to Title II of the ADA, which became effective on January 26, 1992, any public entity must make its programs, activities and services readily accessible to and usable by persons with disabilities unless doing so would result in a fundamental alteration in the nature of such programs, activities, or services, or would result in undue financial and administrative burdens. Libraries are public entities within the meaning of Title II, and thus, the ADA requires that all programs, services and activities must be readily accessible to persons with disabilities. In this regard, Title II provides certain general guidance for libraries in ensuring compliance, as follows:

- Program access can be provided by, among other methods, reassigning services from inaccessible to accessible locations, providing auxiliary aids (such as note takers, qualified sign language interpreters and readers, taped texts, assistive listening devices, large print, Braille, or ASCII diskette materials), redesigning equipment, modifying policies, altering existing facilities to remove architectural barriers, or constructing new accessible facilities.

- In order to ensure adequate communications with persons who have hearing, vision or speech impairments, a library may supply assistive listening systems, television and video captioning, telecommunication devices for the deaf (TDD), Braille, large print, etc.

- All special programs, social events, readings, lectures or similar events (e.g., exhibits) must be held in architecturally accessible locations.

*note: The illustrations are paraphrased from the ADA. The entire Americans with Disability Act can be found at 42 USC Sections 12101 et seq.

ADAPTIVE COMPUTING TECHNOLOGY AND LIBRARY INFORMATION ACCESSIBILITY

The American Library Association's "Library Bill of Rights" provides that "books and other information resources should be provided for interest, information, and enlightenment of all the people of the community the library serves." In accordance with this basic policy, libraries historically have undertaken vigorous efforts to provide access to information, collections and materials by implementing classification systems, preservation programs, mediated reference and referrals, interlibrary loan and information literacy programs. Beginning in the early 1980s, these efforts were expanded tremendously by the development of new information technologies. However, since access to information technology now is synonymous with access to information, libraries must carefully evaluate access to on-line information systems. In seeking to provide access to all users, and to comply with the ADA, libraries can benefit from the integration of "adaptive computing technology" into their on- line information systems and public computer workstations.

Adaptive computing technology can be defined as any modification made to standard computer software and hardware to enable people with disabilities to work -- functionally, without a disability -- on an equal basis with their non-disabled peers. Adaptive computing technology offers people with disabilities the opportunity to not just use computers, but to use computers to complete tasks that were previously not possible for them, including working with greater independence with on-line catalogs, reference materials, books, newspapers and other library resources.

For example, a voice synthesizer with "screen reading" software can give a person who is blind auditory access to on- line books and journals, while "reading machines" provide auditory access to print materials. Or, by using a voice recognition system, a person with an orthopedic disability can verbally maneuver through the searches required to access text- based information and on-line catalogs. Consider the television commercial recently presented by a major computer manufacturer. The commercial

depicts a modern business executive standing near his desk and "asking" his computer to pull up certain file information. By utilizing this technology, the executive is able to review and update files, make notes and access information within his computer without using his eyes and hands. Adaptive computing technology is not just about disability access, it is about universal access.

THE UCLA MODEL

The UCLA Library's mission "is to provide access to and delivery of information resources to the UCLA faculty, students and staff in support of the research and instructional mission of the University. The Library develops, organizes, and preserves collections for optimal use and provides links to remote information sources. The Library provides services, including instruction for information literacy and information management, to enable its users to fulfill their academic and intellectual needs...."

In 1994, the University Library began the process of designing specifications for a major enhancement of its on-line catalog, including consideration of the requirements of the ADA. To that end, the authors were asked to create a specification for the new on-line system to address the need for disability access. We took as our guiding principle a fundamental recognition that universal access requires universal design --an awareness that is now beginning to move from adaptive computing advocacy circles into the information technology mainstream.

On-line Information System Design

The UCLA Library on-line database, ORION, incorporates the electronic card catalog and numerous special electronic collections and information systems, including, but not limited to: the Chicano Studies Resource Center Library, the Institute of Social Science Research, the Hispanic American Periodical Index, the Film and Television Archive, InfoUCLA, the campus-wide information system, and Melvyl, the University of California on- line catalog, along with the several full-text databases that Melvyl supports. The current implementation of ORION is character-based, making ORION readily accessible by people with disabilities in general, and with print impairments in particular (people with blindness, low vision, certain learning disabilities, and orthopedic disability that makes reading physically difficult). This accessibility is due to the relatively straightforward conversion of screen characters into voice output, large print, and Braille through the use of microcomputer-based adaptive devices (voice synthesizers, large print software, and Braille screen displays, respectively).

The Library is currently planning a new implementation of ORION, presently named ORION2. ORION2 will incorporate a graphical user interface (or GUI), enabling users to access a much richer variety of documents, incorporating both text and graphical elements. However, the GUI environment can present a range of challenges to the print-impaired user, from bit-mapped text, images and icons that do not convert to voice output or Braille, to variable screen layouts that can be difficult or impossible to learn for a user who is blind.

A number of design specifications have been developed for ORION2 to guide the systems developers who will build it. One specification was written to insure that users of the library on- line system who have disabilities, and print impairments in particular, will have equal access to the same information as their non-disabled peers. This specification is particularly important to maintain accessibility in the transition from a character-based ORION to a GUI-based ORION2.

The ORION2 disability specification was written as a very general design guideline. The intent was to present a design philosophy to guide the systems development process, rather than a set of specific application features to follow strictly. The final shape of ORION2 is not known at this time; in fact changes will be made to the program on an ongoing basis, as with the present ORION system. The design specification must be flexible enough to apply to an evolving on-line information environment that cannot be fully anticipated today. As a case in point, consider the speed with which Gopher grew in popularity as an Internet client, only to be eclipsed even more quickly by the World Wide Web. What is the projected life span of the Web and what will be the effect on future on-line systems of its successor?

Most systems developers do not have expertise in adaptive computing technology and how to integrate it

with on-line library information systems. They will need pointers to more detailed design guidelines to draw on as needed, to meet the intent of the disability specification. The ORION2 disability specification includes references to other guidelines that collectively represent much of the current state of knowledge of computer and information accessibility design. As this knowledge will also evolve, the ORION2 disability specification itself needs to be a work in progress.

The effectiveness of a library on-line information system depends on its use within the overall context of general library services. Hence, the disability specification addresses areas of concern not only to system designers and developers, but also to library administrators, library computing services, reference, instructional services, etc. These are the units that will be responsible for advocacy, design, implementation, training, and ongoing support and service for an on-line information system that is accessible to users with disabilities.

The specification is divided into four parts:

1. A statement of the level of accessibility the system must meet. This statement reflects a goal of full equality in both information accessibility and usability.

2. Specific design criteria for the system. These criteria provide a framework for system developers, library administrators, library computing services, etc. to organize their accessibility efforts.

These are simplified into four areas: accessible user interface, accessible electronic documents, accessible public workstations, and accessible documentation.

Examples are given of each of the criteria, and references are made to general design considerations and more detailed technical accessible design guideline references (below).

3. General design considerations provide a design philosophy to implement the specific criteria above. They include mainstreaming, electronic curb cuts, usability analysis, and built-in (direct) accessibility.

4. Accessible design guideline references provide the nuts and bolts reference resources for designing an accessible on-line system.

These guidelines were developed by organizations that have pioneered information technology accessibility for people with disabilities, including Trace, CITA (COCA), ICADD and EASI. The list is not meant to be exhaustive, and the library is encouraged to seek out additional resources that may be relevant. Additional reference sections also cover built-in accessibility and disability access to the World Wide Web. Internet addresses are given for most documents.

This specification represents our best efforts to help guide the design process toward equal library information access for people with disabilities. The authors welcome comments that might enhance the scope, depth, and effectiveness of the specification.

UCLA LIBRARY ORION2 DISABILITY SPECIFICATIO

N I. (X19.) System shall meet or exceed standards set by state and federal disability law. System shall be accessible to and fully usable by users with disabilities.

II. Specific Design Criteria

1. Accessible User Interface

The user interface shall be accessible to and fully usable by users with disabilities. Accessibility to the interface applies to on-campus and dial-in use.

Examples:

- Screen design must be readable by users of speech and Braille devices. This can include having the cursor track along with a highlight bar.

-The command environment must be fully controllable with keystroke commands, as an alternative to pointing devices, for people with visual and certain orthopedic impairments.

- Visual cues must be provided for people who cannot hear audio cues, and audio cues for people who cannot see visual cues.

- Screen colors must be adjustable for people with color blindness, certain learning disabilities, and for visually impaired people who must configure screen reading software.

- Ability to turn off or adjust cursor blinking rates must be available for people with epilepsy.

For design guidelines, see References 1 (CITA), 2a and 2b (Trace), 6, (all World Wide Web Accessibility citations), General Design Consideration 4 (Built-in Accessibility) and Reference 5.

2. Accessible Documents

Electronic documents must be accessible to and fully usable by users with print impairments. Full usability requires the preservation of document data and structure.

Examples:

- Use of valid HTML 2.0 for document markup enables the translation of documents, via the ICADD SGML DTD, into Braille, preserving much document structure. ICADD translation to speech and large print output is under development.

- Use of SGML for document markup preserves more document structure (than HTML) in the conversion to Braille via the ICADD DTD, and offers greater opportunities for future document accessibility with other accessibility standards that may be developed.

- Note that attention must be given so that graphical document elements have textual equivalents, to provide access for the print impaired. For design guidelines, see General Design Consideration 3 (Usability Analysis), References 3 (ICADD), and 6 (all World Wide Web Accessibility citations).

3. Accessible Public Workstations

Public workstations must be accessible to and fully usable by users with disabilities.

Examples:

- Users with wheelchairs may need keyboards and displays set to differing heights.

- Users who are blind may need tactile marks on keyboards and voice synthesizers for audio output of screen information.

- Users with low vision may require screen magnification software or large (17" or greater) displays.

See General Design Considerations 1 (Mainstreaming) and 2 (Electronic Curb Cuts). See References 1 (CITA), 2c (Trace) and 4 (EASI).

4. Accessible Documentation

Documentation must be provided to users with disabilities in alternative formats. In selection of format, priority is given to the users own format preference (following the ADA).

Example:

- Alternative formats may include audio tape, Braille, large print, ASCII files or other accessible electronic document formats (see 2, above, Accessible Documents.)

See General Design Consideration (Usability Analysis), and all References.

III. General Design Considerations:

1. Mainstreaming: All public computing areas must be universally accessible. Whenever possible, run adaptive software solutions from network servers. This will provide these accommodations on all networked workstations. This will allow adaptive hardware peripherals to be used flexibly on any networked workstation. Place all stand-alone adaptive computing technology in public computing areas.

See also 2 below.

2. Electronic Curb Cuts: As widely as possible, utilize accommodations which, in addition to benefitting users with disabilities, enhance computing for all users.

Examples include

A. Hardware: large displays (17" and up), trackballs, light-touch keyboards, etc.;

B. Software: see 1, above and 4, below;

C. Furniture: height adjustable tables, adjustable chairs, indirect lighting, etc.

3. Usability Analysis: The system must not only be accessible, it must be fully usable by people with a range of disabilities. Full usability shall be determined through a usability analysis by experienced campus adaptive technology providers.

4. Built-in Accessibility: Accessibility for voice output, large print, and keyboard control can be built directly into the user interface, augmenting individualized access solutions, or eliminating the need for them altogether. This is also known as "Direct Accessibility." A prototype demonstrating the viability of this approach was developed by the Trace R & D Center for access to bibliographic data base software. See Reference 5. Every effort should be made to examine the feasibility of this approach for ORION2.

IV. Accessible Design Guideline References:

1. CITA Guidelines: Center for Information Technology Accommodation (formerly "COCA"), U.S. General Services Administration. Design guidelines for implementing Section 508 of the Federal Rehabilitation Act of 1973. See especially Appendices A and H. http://www.gsa.gov/coca/front.htm
CITA WWW Homepage: http://www.gsa.gov/coca/

CITA Information:
General Services Administration,
Center for Information Technology Accommodation, KBA Room 1234
18th & F St. NW
Washington, DC 20405.
(202)-501-4906.
Paul.Fontaine@GSA.GOV

2. Trace Guidelines: Trace Research and Development Center.

a. "Considerations in the Design of Computers to Increase Their Accessibility by Persons with Disabilities, Version 4.2," 1988.
gopher://trace.wisc.edu/00/ftp/PUB/TEXT/ACCESS/GUIDELNS/COMPUTER. TXT

b. "Application Software Design Guidelines: Increasing the Accessibility of Application Software to People with Disabilities and Older Users, Version 1.1," 1994. gopher://trace.wisc.edu/00/ftp/PUB/TEXT/ACCESS/GUIDELNS/SOFTWARE. TXT

c. "Checklists for Making Library Automation Accessible to Patrons with Disabilities," Berliss, J. R., 1992.

Trace Information:
Trace Research & Development Center
S-151 Waisman
1500 Highland Avenue
Madison, WI 53705.
(608) 262-6966.

3. ICADD Guidelines: The International Committee on Accessible Document Design, ICADD SGML DTD (ISO 12083). http://www.webable.com/ICADD.html; gopher://gopher.mic.ucla.edu:4334/11/ICADD/info

ICADD Information: kerscher@montana.com (406)549-4687.

4. EASI Guidelines: Equal Access to Software and Information. "EASI's Adaptive Computing Evaluation Kit for Colleges and Universities." http://www.isc.rit.edu/~easi/easipub/easipubadakit.html EASI Homepage: http://www.isc.rit.edu/~easi/ EASI Information:

EASI@EDUCOM.EDU (714) 830-0301

5. Built-In Accessibility References

"Building Disability Access Directly into Next-Generation Information and Transaction Systems." gopher://trace.wise.edu/0/ftp/pub/standard/tracepap/seamless.asc;

and

"Use of Multiple Parallel Interface Strategies to Create a Seamless Accessible Interface for next-Generation Information Systems." gopher://trace.wisc.edu/0/ftp/pub/standard/tracepap/seamless.asc Vanderheiden, G., 1995, Trace Research and Development & Center.

Note: A demonstration of built-in approaches can be found on the Publications, Media and Materials (PMM) database on the Co-Net CD 7.0, available through the Trace Center.

6. World Wide Web Accessibility References

"Making the Web Accessible for the Blind and Visually Impaired," Paciello, M., 1995 http://www.webable.com/guestart.html

"Design of HTML (Mosaic) Pages to Increase Their Accessibility to Users With Disabilities," Vanderheiden, G., 1995 http://www.trace.wisc.edu/HTMLgide/

"Universal Information Access on the WWW," Fontaine, P., 1995 http://www.gsa.gov/coca/csun.htm

"Writing Accessible HTML Code," Fontaine, P. 1995 http://www.gsa.gov/coca/nii.htm

NCSA Mosaic Access Home Page http://bucky.aa.uic.edu/

"The Accessibility of PDF and Adobe Acrobat Viewers for the Visually Disabled," McQuarrie, L., 1995. http://www.adobe.com/Acrobat/Access.html

ACCESS TO LIBRARY INTERNET SERVICES FOR PATRONS WITH DISABILITIES: PRAGMATIC CONSIDERATIONS FOR DEVELOPERS

Courtney Deines-Jones
East Baton Rouge Parish Library
Baton Rouge, LA 70802 USA

When libraries offer patron access to the Internet and other on-line services, they must consider the needs of patrons with disabilities who will be using their Internet links either from the library or from remote sites. In planning and implementing technological improvements to optimize access for all patrons, librarians and information specialists must allow for both physical and intellectual access to electronic information. This paper addresses these issues from a pragmatic perspective, reviews available options and suggests strategies for improving access for people with various disabilities.

The Internet Explosion and Patrons with Disabilities

Many libraries are using Internet access to improve patron services. In the United States, an estimated 21% of public libraries have some type of Internet connection, with libraries in urban areas (having a patron base over one million) connected at a rate of 75% (St. Lifer, 1994). These libraries are taking different approaches to providing Internet and on-line services to their patrons. Some have connections from terminals located inside the library; others allow dial-in access from patrons' offices or homes. As services grow in sophistication, so do patron interfaces. Many new computers sport a full-color mouse-driven Graphic User Interface (GUI) which allows access to CD-ROM products, World Wide Web sites, and other multimedia products.

The number of people who have disabilities is also increasing. As a group, Americans are aging, and life spans are increasing. Thanks to improvements in medical technology, more children with disabilities are surviving through infancy and early childhood. Advances in technology are also allowing people with disabilities to have greater freedom of motion, and more effective means of communicating. In 1990, over thirteen million Americans (excluding those living in institutions) reported using some sort of assistive technology device to help compensate for a disability. This reflects a continuing growth in the use of such aids (U.S. Department of Commerce, 1994). This growth has spurred a movement to ensure that educational, cultural, and employment opportunities are open to all, no matter what their disability.

Educational facilities have been at the fore of this movement. Since 1980, the number of children enrolled in educational programs for the disabled has risen by over 400,000. Of these, the majority are in regular classrooms for at least 40% of the school day (U. S. Department of Commerce, 1994). As educational opportunities continue to improve, library services will become even more important.

For patrons with disabilities, expanded library services and new computer access options are especially exciting. The Internet can truly open a world of information to people who have disabilities. Through E-mail, chat groups, and listservs, people can make friends and talk to others even if they have severe communication disorders. People who have rare disabilities can use the Internet to forge links to information and support groups that might otherwise be completely inaccessible. Legislative action alerts and electronic political forums give people who may find travel difficult the opportunity to actively shape government policy.

For these reasons, most people with disabilities welcome library access to the Internet. Many, however, have difficulty using a standard computer interface. For others, multimedia innovations represent potentially insurmountable barricades to full Internet access. Some patrons may also find learning multiple methods of searching to be frustrating or impossible. Most of these barriers were not consciously built by information and computer specialists, and many can be overcome if librarians consider both physical and intellectual access issues when they plan their access options.

Physical Access Problems

Physical access problems are usually obvious and can be addressed by information professionals from many disciplines. Programmers can develop new GUI standards; librarians may offer to sit with patrons and describe multimedia images that are not captioned. Careful planning beginning with the actual computer interface should ensure that every patron has basic physical access to the Internet.

The standard computer interface consists of a keyboard, mouse and screen. Many people with disabilities find this interface cumbersome or impossible to use. Many companies are addressing physical interface difficulties, and work-arounds exist for most potential problems. Not every solution is appropriate for every library. Ideally, libraries would base adaptive technology purchasing decisions solely on patron needs. In the real world, however, cost and space are often big factors in a library's choice among options. Fortunately, augmenting expensive and sophisticated devices are many inexpensive and free products available to help libraries provide the best possible Internet access for patrons with disabilities.

Freebies

Solutions to overcoming physical access barriers are often free. A computer workstation can be made accessible to people who use wheelchairs by raising the table with wooden blocks. Keeping cables neat and workstations clear of books and supplies may give patrons the extra space they need to manipulate switches, plug in headphones, or adjust monitors. By setting preferences correctly, librarians can make their interfaces more inviting to people with disabilities without spending a dime. The most appealingworkstations include only items that patrons can use and understand, and are clear of any distractions or obstacles. This principle applies not only to the physical work area, but also to the layout of the display on the screen.

- For any computer display, the active window should fill the screen. Every inch of the screen is valuable. If patrons use an on-screen keyboard, the active window should be short enough to accommodate the keyboard, but expanded to the full width of the screen.

- Usually, tool bars should be turned off. Screen readers for the blind do not recognize them, people with low vision cannot see them, and people who have cognitive impairments may not understand them. One exception: people with mobility impairments may want the tool bars left on. For these patrons, it is easier to use the tool bar than to execute multiple-key commands.

- When a computer is set up for use by blind or visually impaired patrons, in-line images should be turned off, or the interface should be through a text-only program such as lynx. Screen readers do not recognize images, but they can interpret image captions.

- Following Internet links will be easier for patrons if the library has its own home page. The page should clearly show common links using a display with large fonts, highlighted anchors, and well-captioned images.

Internet sites are convenient sources of many free programs. The University of Wisconsin Trace Center, for example, offers free adaptive ideas and programs through their gopher site (gopher to trace.wisc.edu). The University of Kansas sponsors a web site with programs for the Mac (http://www.sped.ukans.edu/~dlance/freeindex.html). Not all solutions, of course, are free, but many of those that do cost money cost very little.

Screen Magnifiers

One inexpensive and readily available adaptive tool is a screen magnifier. Screen magnifiers are software programs that allow patrons to view the computer screen at various levels of magnification. They may also let the patron manipulate color or intensity to help people who have trouble distinguishing certain color combinations. Screen magnifiers are usually mounted on a PC or MAC platform, rather than on a dumb terminal; this may raise the cost of initial installation. Not all screen magnifiers are identical, and there are several features librarians should look for when considering this type of software.

- Patrons should be able to magnify as much of the screen as they like; this may mean expanding a line, a word, an icon, or the entire screen. Patrons who use screen magnifiers may also have limited mobility, so expansion methods should not involve complex or fussy controls.

- Because patrons have varying print size preferences, a system with adjustable magnification is usually better than one that only offers a normal-to-big toggle. This is especially true if patrons will be using the magnifier with Windows-type interfaces, where font sizes and detail levels vary.

- Patrons using color monitors should be able to change display colors and intensity. On any type of monitor, patrons should be able to reverse the image (changing green-on-black to black-on-green, for example) within the magnified window if they wish to. Again, the commands to do this should be clear and not fussy.

Voice Interfaces

Screen magnifiers may be all that most patrons with low vision need. Some patrons, however, have severe visual impairments or are totally blind, and cannot read a screen even with magnification. For these patrons, voice interfaces are the most common adaptive programs. These systems help the many blind and visually impaired people who do not read Braille. They also aid patrons with learning disabilities that make print comprehension difficult. People who cannot use a keyboard or mouse because of limited mobility may use a voice interface as well. Voice recognition technology is improving, and more non- disabled users are using voice interfaces. This growing interest from many Internet users is helping spur further advances in the technology.

Voice recognition programs do differ. Some voice interfaces are one-way only, reading information that appears on the screen. Others work both ways, allowing the user to dictate material the computer translates into commands or even into written text. Because the technology is so volatile, it is difficult to point with certainty at any one program as the "best." There are, however, features and caveats librarians should keep in mind when evaluating any voice interface.

- A voice interface should have a buffer that stores output so that patrons can replay information if they need to. Commands for doing so should be unambiguous and should not require dexterous multiple keystroke combinations.

- While voice interfaces can identify some icons, buttons, and the like, for the most part they cannot identify pictorial information. Consequently, they work better on textual applications than on multimedia products and web connections. Librarians using a voice interface on a web connection may prefer to go through a textual interface such as lynx.

- Volume controls on voice interfaces should be large and easy to operate, and should have Braille or tactile indicators for blind patrons. As noted below, people who are blind are not necessarily Braille literate. Whenever there is any doubt as to patron preference, the setup should be designed so that a non-Braille reader can negotiate the interface.

- Headphones used with voice interfaces should have separate volume controls for left and right ear inputs. These controls should be easy to operate. If the patron will be plugging in the headphones, the jack should be large and located at the front of the computer, within easy reach of the patron. All inputs should be marked with Braille or tactile labels. Switches which should not be touched should be protected if they are near any input jacks or controls. This will ensure that patrons do not turn the computer off, push the reboot button, or otherwise inadvertently disrupt operations.

- Voice interfaces make noise. Unfortunately, work station designers often overlook this obvious fact. When a system consists of an output-only interface, headphones may be sufficient to ensure privacy and reduce disturbance. If the computer has voice recognition software, however, patrons will be talking as well. In these cases, computers should be housed in separate, quiet areas. At a minimum, each station should have walls, like a study carrel, to reduce extraneous noise and maximize privacy.

- As with screen magnifiers, voice interfaces must be mounted on a computer, rather than on a dumb terminal. Again, this may add to the initial setup costs.

Braille Displays

Voice interfaces currently have the most universal appeal among adaptive interfaces. However, for many blind computer users, a Braille display is the preferred interface. Braille displays use a special 8-dot readout (instead of the usual 6-dot Braille cell) to show highlighted or otherwise enhanced items. Braille displays usually augment a standard keyboard. The patron uses the keyboard as an input device, and the Braille display to read what is on the screen. Braille interfaces are quite expensive, and most appropriate for libraries with many blind patrons. Librarians who are thinking of installing Braille interfaces should keep some important points in mind.

- Most blind people do not read Braille. As an example, only 7% of the blind patrons registered with the Louisiana State Library's services for the Blind and Physically Handicapped use Braille material (Anjier, 1995). This number may decrease further as more children are taught in integrated schools where Braille literacy is not stressed.

- Librarians can improve the friendliness of a Braille interface by installing Braille overlays on the keyboard itself. These overlays are very inexpensive and do not generally bother other people who use the computer. If the keyboard is left in an unattended area, the overlays should be checked periodically to ensure that pranksters have not removed, inverted, or switched the overlays.

- Patrons who want to use text-based Internet services such as e-mail, telnet, ftp, and traditional gopher services will get the most benefit from a Braille display. Web users will have more difficulty, because Braille displays cannot interpret pictorial information. Some buttons and icons can be translated, but most visual information cannot be adequately represented. As an easy solution, libraries using Braille displays should get to web sites through a textual interface. Most of these programs will automatically convert multimedia information into text captions.

- Braille printers (and the software to support them) should be provided at all work stations with Braille displays. If the printer does not have Braille control keys, Braille overlays should be added. Some libraries do not allow printing and instead encourage patrons to copy material to floppy disks. When this is the case, file format preferences should be set carefully. Blind patrons will want material copied in flat ASCII files that will work with whatever adaptive programs they normally use.

Alternative Keyboard Options

Blind users may appreciate Braille overlays as an aid to keyboard use. People with mobility and some cognitive impairments may need more radical adjustments to using a keyboard interface. While people with mobility impairments can probably read the computer display without difficulty, they may have a hard time typing commands or moving a mouse. There are, however, options for librarians who want to work around a standard keyboard interface and provide access in the least restrictive way possible.

- Software solutions include work-arounds for multiple-key commands and mouse-clicks. Some also configure the numeric keyboard to replace the mouse for easier cursor movement. Many of these programs are freely available through the Internet. A good overview of available programs is available through the NCSA Mosaic Access Page (NCSA, 1995).

- Keyguards use templates to guide the user's hands. On many templates, keys that are not used can be blocked off, so that there is no chance of a user hitting them accidentally. This type of template is especially useful for interfaces that are entirely menu-driven, but it limits the user's ability to conduct searches.

- Expanded keyboards have extra function keys. The keys may also have slightly larger footprints. The function keys can be configured at will to eliminate the need for multiple-key combinations.

- Programmable adaptive keyboards allow librarians to program keys and adjust options to suit a variety of patron needs. They are usually more versatile than expanded keyboards, because they allow any of the keys to be specially programmed. This type of keyboard may be the best choice for libraries using programs that incorporate many two- or three-key combinations.

- On-screen keyboards are software programs that reproduce the keyboard on the screen. They enable a mouse, trackball, or pointer to act as an on-screen "finger," moving to each letter and clicks on it in turn. Users can program special "hot key" symbols to replace multiple-keystroke commands, further simplifying computer use.

- Trackballs require less movement to operate than a standard mouse and can benefit some people who have limited arm mobility. They may also reduce problems associated with repetitive stress disorders of the upper arm and shoulder. Other alternatives to standard mice include head pointers, digitizing tablets, and finger-operated pads.

- Touch screens can help patrons who cannot manipulate a mouse or trackball, but who can reach the screen. A touch screen may also be a useful interface for menu-driven programs that feature limited choices and big buttons.

Work Station Access

Of course, no computer interface will be accessible until the work space itself is accessible. Many libraries have one "accessible" workstation that incorporates all special adaptive interfaces. The "accessible" station is then set up on a wheelchair-accessible table or stand. Because many people who use wheelchairs have no trouble with a standard computer interface, "regular" stations should also be accessible to wheelchair users. Similarly, some people who do need adaptive equipment cannot use a computer on a low desk. To accommodate these patrons, adaptive workstations should also be placed at a standing height. Librarians designing Internet computer stations should try to follow guidelines to maximize accessibility for all patrons.

- Paths to work stations should be 36" wide whenever possible, and no less than 28" wide at any point to accommodate people who use wheelchairs, walkers, crutches, and other mobility aids.

- If there are multiple work stations available, one should be at a standing height station. This is a benefit to people who have a hard time getting up and down and to those who cannot sit for long periods. Adjustable-height computer tables are available when libraries can install only one adaptive workstation.

- Ideally, all seated work stations should have a 28" vertical floor clearance extending at least 20" under the station to give ample leg room for wheelchair users. This area should be clear of cables, power lines, or other obstructions.

- Keyboard shelves should be adjustable, and monitors should swivel and tilt. A flexible-arm monitor mount is the most versatile and is generally worth the expense. This is especially true if the monitor has a touch screen, since the flexible arm will swing closer to patrons who have shorter arm reach.

- Stations designated specifically for wheelchair access should never be blocked by chairs. Although it seems like simple common sense, this is a typical problem at many libraries, especially when accessible workstations are shared with patrons who do not use wheelchairs.

Remote Access

Even libraries with accessible, state-of-the-art adaptive equipment and helpful staff members will not reach all people with disabilities in the community. Some people simply cannot come to the library at all. For these patrons, remote dial-in access can bring the library to them. Using familiar interfaces, patrons can find library information without worrying about transportation, weather, or air quality. The convenience of dial-in access is such that some patrons who can get to the library still prefer remote

connections. The advantages of dial- in access are quite compelling, especially for academic and special libraries.

- Library patrons who use home or office computers to dial in do so on a level footing with any other remote user. There is no fear of prejudice; library staff members will not even know that the dial-in patron has a disability.

- Patrons who have adaptive work stations in their homes or offices can use these same interfaces for Internet access. This makes searching, printing, and downloading files much more efficient. If the patron may download files, information can be translated by the patron's computer into spoken word or Braille formats, or otherwise manipulated at will by the patron.

- Dial-in access is usually available twenty-four hours a day. Patrons can set their own work schedules, which can be especially beneficial to people who have time to spare late at night or in the early morning.

Librarians must not think of remote access as a panacea, however. Dial-in services are out of reach for those patrons with disabilities who cannot afford their own adaptive computer equipment. Dial-in access efforts must include innovative ways to provide full library services, including help with searches, to patrons who rely on remote access. Most important, librarians must ensure that remote access is not used to discourage patrons with disabilities from coming to the library.

Multimedia Web sites

Multimedia Web sites and GUI-based programs present challenges to Internet users with disabilities. Traditional gophers and other text-based sites present few problems to patrons accustomed to using screen readers or other adaptive aids. Many multimedia sites, however, are nightmares. Setting up a home page is quite simple, and many developers are so impressed with the visual possibilities that they build in pretty wallpaper, fancy fonts, and audiovisual clips galore. People with disabilities quickly realized that many of these sites were difficult, if not impossible to negotiate. Researchers and end- users began attempts to work with developers of access programs such as Mosaic and Netscape to standardize Web access methods and accommodate adaptive equipment.

The Mosaic Access Project, with funding from the U.S. National Science Foundation, is the result of one such effort. The project coordinators are devoted to identifying and eliminating barriers to physical access by people with disabilities. Their Web site includes a "wish list" compiled from requests by Internet users who have disabilities. Recent items show the concern people with hearing and visual impairments have about the problems of negotiating a multimedia GUI. A sampling of these suggestions points out areas in which further work is needed (NCSA, 1995).

- Visually impaired patrons want audio- and text-captioned image viewers. Similarly, deaf Mosaic users would like captioned or visually enhanced audio clips.

- Many patrons would appreciate on-line help. Libraries establishing Internet connections could devise their own help screens to assist patrons when the site itself does not have such facilities.

- Mosaic users with visual impairments would benefit from a one-button toggle to set all fonts to a standard default font. Each patron could customize the size, style, color and contrast of the default prompt.

- People who use screen readers would like standards requiring icons to be detectable by screen readers. They also promote requirements for textual labels on all icons and command buttons.

- Users with disabilities also support numbering all anchors in a document sequentially, providing a display of the total count. They further propose a similar scheme for numbering in- line images. This would help people keep track of their relative location in a Web document.

Mosaic programmers have already responded to many requests from the list. Mosaic now supports the

display of textual tags on images whenever image auto-load functions are disabled. Font selection, size, and color can be controlled by the individual, and many other features can be customized. Mosaic has switched to standard icons that screen readers are more likely to recognize. The programmers have incorporated several other changes to make Mosaic more accessible. They have also given the program code to researchers at two universities who are working on accessibility issues (NCSA, 1995).

Unfortunately, the people who produce Mosaic are more an exception than the rule. Many software producers are reluctant to spend programmer time on adaptations for a relatively small portion of the market. Still fewer are willing to share copyrighted computer source code. Librarians choosing among access programs should ask vendors what has been done to provide universal access to their programs.

Intellectual Access

Once the computer has been made physically accessible, librarians and information specialists must consider the intellectual accessibility of their services. Research into on- line retrieval strategies has not focused significantly on differing strategies among people with disabilities. Research in other disciplines has suggested, however, that cognitive processes differ among people with disabilities and among those who speak different languages.

The research implies that some patrons who have learning disabilities that impair print comprehension will benefit from a GUI based system. Others, however, will read print and type without difficulty, but will have trouble understanding icons. Frustratingly, librarians have little or no way to know in advance which interface will prove best for which user. Researchers in cognitive development are working with software developers to create programs to help people with specific cognitive disabilities learn to use computers. These programs are unlikely to help most librarians, however, who must purchase only one or two programs to serve many patrons with different access strategies.

The question of intellectual access also concerns whether a graphical search engine involves more than a simple substitution of pictures for words. A comparison between a DOS menu and a Windows interface offers a simple illustration of this problem. On a menu-driven program, initial choices are usually kept to a minimum. They usually appear in a one- or two-column vertical list with the most common choices listed first, less common choices listed toward the bottom, and an exit or logout option at the end. If there are too many choices to fit onto the list, the menu will lead users to different selections using a tree structure. The menus are generally easy to figure out, even when using a screen reader or magnifier.

Windows interfaces are arranged quite differently. The display can provide the user with many more initial choices, each designated by a pictorial icon and a tiny-type caption. The icons may not be arranged in a standard column. As an example, Microsoft Encarta 1994 has a rainbow shaped icon display, with a second "start" button enigmatically placed at the bottom (Microsoft, 1994). In many programs, there is no obvious way to exit the program without being familiar with Windows commands. The icons may not be in standard form, and would therefore be unrecognized by a screen reader. These problems are typical access barriers associated with GUIs.

Screen reader and other adaptive equipment problems may be solved. Even so, if GUI platforms do represent a new way of searching for and retrieving information, there will be serious implications for people who do not think visually. The questions of cognition are not likely to be closed quickly. For the working librarian who wants all types of patrons to use the Internet, there is help. Following a few general guidelines will help ensure that patrons get the most benefit from the library's system, no matter what their thinking style. Considering the intellectual accessibility of Internet services is at least as important as ensuring physical access.

- Whenever possible, libraries should provide access through both textual and graphical interfaces. When patrons have difficulty with one interface, they can try another.

- Usually, accommodations for people with cognitive disabilities parallel those for patrons with visual impairments. This includes using an uncluttered screen with clear buttons or command choices.

- Patrons with differences in language or cognitive strategies may approach library searches in very disparate ways. Librarians can help these patrons make more efficient use of their time by providing clear models of search strategies, printed in large type and kept near the Internet work stations.

- If possible, a librarian should use this model and go through a few searches with new users, using the same technique. Introducing short cuts or alternative paths is appropriate only after patrons have mastered the basic techniques for navigating the system.

- Because search strategies may be difficult for some people to master, librarians should consider eliminating or expanding time limits for people who are using adaptive equipment or who have cognitive impairments. The added stress of working under a deadline may completely disrupt patrons' search efforts.

Striking a balance

While most libraries would want to provide immediate universal physical and intellectual access to all Internet services, this is beyond the reach of all but the wealthiest libraries. The best course of action involves balancing current patron needs with available resources, and then anticipating the needs of potential users. The following steps can serve as a general guide to making computer information accessible to the broadest possible constituency. A library's goal should be to provide information access; it is not necessary to purchase every adaptive aid on the market.

- Free material can be installed right away, and should be advertised to bring in new patrons. As noted earlier, librarians can obtain many free programs from on-line sources. Vendors and associations that promote computer access for people with disabilities may also offer programs and, sometimes, equipment to libraries. State libraries may also have adaptive programs or equipment available upon request.

- Any purchases or serious programming commitments should be based on the demographics of the library's constituency. Special, school, and academic librarians can probably get information about patron disabilities from their personnel, admissions, and student affairs offices. Public libraries can probably get some demographic information from government and census information or from local disabilities advocacy organizations. Having this information ensures that any adaptive technology purchased or installed will meet the needs of actual users.

- People within the community must be involved in any plans to purchase or install equipment. If the library uses surveys to solicit ideas, they should be distributed to more than current patrons. Many people with disabilities could use the library, but do not know about adaptive interfaces or library services. Others may be unable to use present library services for some reason. Both groups represent important constituencies and must have a voice in any planning process.

- If the library offers dial-in access or adaptive interfaces, these services should be promoted through venues likely to be seen by patrons with disabilities. For example, radio and television notices will reach more visually impaired patrons than will print advertisements, but radio advertisements will not reach most of the deaf community.

- When the library does not have adaptive equipment available, librarians and other staff members must be willing to adopt work- arounds to help patrons. If, for example, there is no interface usable by a patron, a staff member can sit with the patron and type information based on the patron's dictation, reading the screen information back.

- Above all else, staff members must be willing to help. People with disabilities may need more time or assistance when they are using the system. If there are certain times of day that are quieter than others, patrons should know that at those times staff members can give them more one-on-one instruction.

- Both staff and patrons need training to navigate the Internet using adaptive equipment. A connection is useless if the patron does not know the types of information and services available on the Internet.

Similarly, a staff member who knows the Internet well but who cannot use adaptive interfaces will not be much help to patrons. Consistent, ongoing training maximizes the effect of any equipment or software the library installs.

- Statistics on library use by patrons with disabilities will measure the success of library efforts. Statistics should include people who used adaptive aids in the library. They should also count those for whom existing equipment was insufficient. Trends in patron demographics are also invaluable when planning purchases of additional equipment or shift resources to help meet those patrons interface needs.

- Each library should designate one person to stay abreast of advances in adaptive equipment and strategies. Two listservs are particularly helpful in this regard. AXSLIB-L is a site for discussion of library access to patrons with disabilities (address: AXSLIB-L@sjuvm.stjohns.edu). ADAPT-L focuses more specifically on adaptive technology solutions to library access problems (address: ADAPT-L@.american.edu). Both sites follow standard listserv format for subscription requests. Browsing gopher and web sites periodically is another good way to keep up with developments.

- Even if a purchase is not immediately planned, somebody from the library should regularly visit vendors at library trade shows and should stay on the mailing list for vendor catalogs. In the past few years, the number of vendors offering adaptive products and equipment has increased dramatically. Following vendor trends and having an in-house person familiar with available products allows librarians to shop effectively. Librarians who are familiar with equipment and software can also make purchases on short notice when funds become available.

Conclusion

No matter what their patron base, libraries will continue to expand on-line and Internet services. These services will only be universally accessible, however, when librarians make the effort to design adaptive work stations taking patrons' special access strategies into account. Both physical and intellectual access options are expanding as adaptive equipment becomes more sophisticated and as Internet developers become more aware of the need to design alternative access methods into their interfaces. More research is needed, though, before the full impact of a switch to GUI-based interfaces can be estimated. Librarians who cannot afford to wait for research results can still help ensure optimal Internet access. They must base adaptive technology purchases on actual patron needs. When adaptive equipment is not available, they must develop work-arounds and be willing to provide additional help to patrons. Finally, they must keep abreast of advances in access technology and strategies. If they do so, librarians will act not as gatekeepers, but as ushers to the Internet, and will help their patrons who have disabilities enter this exciting world of information.

References

Anjier, Jennifer. Louisiana State Library. Interview by the author, Baton Rouge, LA, 19 April 1995.

Deines-Jones, Courtney. Opening new worlds of information: Library technology and Internet access for patrons with disabilities. In Connectedness: Information, Systems, People, Organizations: Proceedings of the Canadian Association for Information Science 23rd Annual Conference, edited by Hope A. Olson and Dennis B. Ward, 188-197. Edmonton, Alta: School of Library and Information Studies, University of Alberta, 1995.

McClure, Charles. "Public access to the information superhighway through the nation s libraries." Public libraries 34 (Mar/Apr 1995) 80-84.

Microsoft Encarta 1994 edition. Microsoft Corporation, Redmond, WA, 1993.

NCSA access page: A resource for people with disabilities. http://bucky.aa.uic.edu, 11 August 1995.

Nolan, Rita. Cognitive practices: human language and human knowledge. Cambridge, MA: Blackwell, 1994.

Reid, D. Kim, Wayne P. Hresko, and H. Lee Swanson. A cognitive approach to learning disabilities. Second edition. Austin, TX: Pro-Ed, Inc., 1991.

Rodda, Michael. Language, cognition, and deafness. Hillsdale, NJ: L. Erlbaum Associates, 1987.

St. Lifer, Evan and Michael Rogers. "NCLIS study indicates 21 percent of public libraries on the Internet." Library Journal 119 (1 Jun 1994): 16-17.

U. S. Department of Commerce, Economics and Statistics Administration and Bureau of the Census. Statistical Abstract of the United States 1994. Washington, DC: U. S. Government Printing Office, 1994.

Wilson, David L. "Assuring access for the disabled." Chronicle of Higher Education, 4 May 1994, 25; 28-29.

Return to itdv02n4 Contents Page

Return to Journal Volumes Page

LEVELLING THE ROAD AHEAD: GUIDELINES FOR THE CREATION OF WWW PAGES ACCESSIBLE TO BLIND AND VISUALLY HANDICAPPED USERS

Judith M. Dixon, Ph.D.
Consumer Relations Officer
National Library Service for the Blind and Physically Handicapped

Traditionally, it has been the role of the librarian to locate, select, organize, and disseminate information resources. With the advent of online services, this role is now being extended to include providing information about electronic resources in addition to those in print.

For blind and visually handicapped computer users, the availability of electronic information has presented an even greater opportunity than it has for those who are able to read printed material. Prior to this, only a very limited amount of reading material had been available in an accessible format. In fact, texts, such as large reference works, have never been accessible to visually impaired users. For this reason, blind people are finding the burgeoning online services of numerous public and specialized libraries to be of great interest. Librarians should expect a growing number of people who have heretofore not been part of their library's patron population to avail themselves of the library's online offerings.

The person whose vision is not good enough to allow the reading of a standard computer screen can gain access to a computer system via refreshable braille display, synthetic speech, or large print. If a braille display or speech synthesizer is used, accompanying screen-reading software is also required. Numerous software and hardware options are available for large-print access. For this discussion, the focus will be on issues affecting blind persons who use speech or braille access to a computer. Generally, access issues for large-print users are less complex, and very little, if any, accommodation is required to meet their needs.

With the expansion of the Internet, blind and visually impaired people have been able to directly access a wide variety of information from thousands of online resources. However, with the increasing popularity of the World Wide Web (WWW), unique and sometimes insurmountable obstacles have arisen that, more and more often, are barring this newly acquired access. The World Wide Web (WWW)

The power and flexibility of the World Wide Web lie in its ability to present information in multiple formats (text, audio, video, graphic, etc.). However, the features that provide power and elegance for some users present barriers to others. For example, services that depend solely on graphic images are completely inaccessible to blind users. Careful design and coding of information can alleviate many of these access barriers.

For blind users, some inroads have been made into the use of graphically based access methods, but the current access still permits only a rather cumbersome and restrictive use of graphics browsers like Mosaic and Netscape. A far more straightforward access opportunity is afforded to blind users by text-based browsers such as Lynx. Since actually "viewing" a graphic element is not usually an option for most blind people, the only possible advantages of using a graphical WWW browser are the instant availability of audio playback, an occasional opportunity to move through an inaccessible image that would halt a text-based browser in its tracks, and the possibility of seeking additional information about a graphic image from a sighted person.

It is not just blind and visually handicapped computer users who may have a need for access options. It is essential to remember the wide range of users you are designing for when creating WWW pages at a library. Library patrons who can connect to the WWW typically range from those with high-speed connections, to those with lower-speed modem connections, and even those with no more than text-based telnet access to the Web. Although it may not always be practical to design for those users with the most limited access, it is still a good idea to remember that these users exist and acknowledge

them through warning messages or by creating alternate paths.

A WWW document does not need to be limited only to text to be accessible. There are a number of strategies that can be used to allow inclusion of graphics while still maintaining accessibility. Following these simple guidelines for designing and coding accessible WWW documents can make your documents available and more usable to all. It is important to note that implementing these guidelines does not compromise the aesthetics or functionality of the service.

HTML (Hypertext Markup Language)

HTML is the encoding method used for documents or "pages" on the World Wide Web. Within the HTML language, the designer has the ability to create hypertext references to other HTML pages and resources, both locally and elsewhere on the Internet. These resources can be images, motion videos, and sounds in addition to text files. For librarians establishing Web sites, it is important to know how Web documents are structured and how to apply proper design and layout principles to ensure the desired result.

HTML documents are written in plain ASCII text and can be created using any text editor. Web documents are coded, or "marked-up," with tags resembling those produced by some word-processing programs. These tags serve to structure the page by designating heading sizes, paragraph breaks, lists of items, quoted text, and strong or emphasized words, to name a few.

To view a document on the Web, client software called a "browser" is used -- the most commercially popular browsers being designed for graphical environments such as Microsoft Windows, Macintosh, and OS/2. The recent growth of graphical browsers now gives WWW users a variety of choices for viewing Web pages. Although Mosaic and Netscape may be the current browsers of choice for the well-equipped sighted person, many users still connect to the Web with text-only browsers such as Lynx (developed by the University of Kansas). Some of the reasons people use a text-based browser include:

- graphical browsers pose severe access barriers to people with visual disabilities;
- graphical browsers demand the power of high-end computing platforms -- 486 CPU and above; and,
- text-based browsers offer faster response time and can reduce financial barriers for members of the public and
- citizens of developing countries who pay for network access by the hour.

Designers of WWW pages will not have ultimate control over the appearance of their creations. Each Web browser interprets the HTML codes in a slightly different way with variations in spacing, bullet styles, and general adherence to the current HTML standard (version 2.0). The actual font size and type will be under the control of each user and will be further dependent on the capabilities of the WWW browser in use. Therefore, it is important to test each HTML document on a wide variety of browsers prior to placing the document in a production environment.

Page Layout

To enhance accessibility, keep layout simple. Avoid side-by-side presentation. It is possible to simulate a columnar text format within

```
 (preformat) HTML tags.  Unless otherwise
instructed to do so, screen-reading software for speech
synthesizers and braille displays presents information one entire
line at a time reading across.  Therefore, columnar information
can be very confusing when encountered unexpectedly.
Hypertext Links
```

When encoding hypertext links within a WWW page, it is helpful to include enough words in the link so that it could stand alone. Users of speech synthesizers or braille displays can choose to read Web pages in two ways: 1) reading all of the text on the page, including the hypertext links; or, 2) reading only the link text. Since the latter is often more efficient, it is helpful when the link text can stand on its own. If a visually impaired user encounters a page where every link reads "click here," "click here," "click here," the page will be somewhat difficult to use. Users of screen-reading software can quickly review highlighted text, so the more descriptive the link, the better.

Inline Images

An inline image is a graphic element that appears along with the text on a Web page. These are encoded in HTML using the tag. For accessi attribute within the tag for each inline image provided on the page. This tag provides an opportunity to present textual identification or a description of the image for users with text-only browsers, or for those who choose not to load inline images due to performance issues.

The HTML code for such a reference would look like this:

Image of Gettysburg Address exhibit poster, featuring a portrait of Abraham Lincoln

This ALT (alternate text) attribute is an alternative to the graphics and will be displayed in text-only environments. The ALT text can contain entities, e.g., for accented characters or special symbols, but it can't contain markup.

For simple images, such as icons performing the function of bullets, use simple ALT attributes. Using a long text description, e.g., ALT="This is a little blue ball," clutters the screen and doesn't provide useful information. To simplify things, it is advisable to use bulleted lists (the code in HTML) or use simple elements to indicate bullets like the asterisk or small letter "o." These are good alternative text choices in the code, but remember to always include one space after the character you choose (e.g., ALT="* " or ALT="o ").

Using Images as Hypertext Links

If the person attempting to access an image file is using a text-based browser or has graphics turned off in other browsers, the link will be completely lost. A separate "text" file should be made available giving a description and/or a transcript of the image.

An example of such a presentation would be:

Image of the "Nicolay Draft" of the Gettysburg Address. Page 2.

Transcript of the "Nicolay Draft" of the

BEST COPY AVAILABLE

Gettysburg Address

In general, it is preferable to provide graphic and text options on the same page rather than offer a separate "text-only" page. Even blind users may sometimes want to pull up a picture to show someone, or to have someone describe it in more detail.

Image Maps (ISMAP)

An image map is a graphic that has been mapped to allow different areas of the image to represent hypertext links to other documents (selectable via a mouse).

The ISMAP attribute is used within the tag to denote an image as an image map. Because image maps exclude users with text-based browsers, you must provide an alternate means for selecting those items directly above or below the image map, as well as instructions for the user.

Graphically Based File Formats

Graphically based file formats should be used only as alternatives to ASCII files. Some file formats, such as Portable Document Format (PDF) from Adobe Inc., are strictly graphic in nature and are, therefore, inaccessible to users operating in a text mode or to those who do not have an appropriate viewer for the format.

If documents must be provided in a specialized format, provide the equivalent text file in HTML or plain text format. Some Web sites are introducing special data structures and viewers to differentiate themselves or provide special functions not available with the standard tools. The only way for these custom data and views to be accessible is if the access is built directly into the viewer. Standard access tools do not generally work with special viewers.

Forms

The use of forms will restrict only a very small number of users. The most prevalently used text-based browser is forms-capable and can be easily used by those individuals accessing the WWW with speech or braille devices. However, there are some text-based browsers (such as Doslynx) that do not support forms, and such browsers must be used by those with certain kinds of network connections. To accommodate such access methods, it is recommended that an optional e-mail address be provided to allow the individual to submit the requested information by e-mail.

The Future of HTM

L It is anticipated that future versions of HTML will include additional elements that will be beneficial to blind and visually impaired computer users. More opportunities for descriptive text, special table handling, and special treatment for math and science notation are at least part of proposed versions.
Conclusion

The precise degree to which a particular WWW site or page is accessible to blind users depends, in large part, on the knowledge and awareness of the Web page designers. Many excellent pages have already been designed so that the content is accessible in a variety of ways, taking into account those accessing the page with a text-based browser while still accommodating those with a desire for more visually stimulating graphical presentations.

In general, to create WWW documents that will be accessible to people with visual disabilities, you need to either avoid using some features and data types or provide alternative methods for carrying out the functions or accessing the information provided through the inaccessible functions. In the future, alternative access methods for standard features may be built directly into WWW browsers, as well as the standard data storage and transmission

BEST COPY AVAILABLE

formats, making it unnecessary to avoid certain features or build redundant mechanisms into your HTML documents. Until these alternative access features and standards are developed, however, care must be taken in the design of HTML pages if they are to be accessible to users with visual impairments.

There are a wide variety of ways to construct a WWW document, and there are many style manuals now available that offer assistance in creating pages that are consistent and easy to use. It is important that each library develop its own standards based on local needs and preferences. Some design considerations presented here, however, are not usually included in most style manuals and should be kept in mind when developing local standards to ensure real accessibility for the entire population.

For Further Information

For a more detailed presentation of these guidelines, you should consult:

"HTML Guidelines" at http://www.trace.wisc.edu/HTMLgide/

and

"Writing Accessible HTML Code" at http://www.gsa.gov/coca/WWWcode.htm

Return to itdv02n4 Contents Page

Return to Journal Volumes Page

BEST COPY AVAILABLE

RECORDING FOR THE BLIND AND DYSLEXIC: THE DEVELOPMENT OF AN INTERNET ACCESSIBLE ONLINE CATALOG

Steve Noble
Technical Consultant
Recording for the Blind and Dyslexic
Media Services Coordinator, University of Louisville Libraries

PROJECT BACKGROUND SUMMARY

Recording for the Blind and Dyslexic (formerly Recording for the Blind) has been providing audio recordings of educational texts since its founding in 1948. RFB&D's master tape library currently contains over 80,000 volumes, making it the largest resource of its kind in the world. Beginning in 1992, RFB&D initiated a project to develop an online public access catalog that would allow both institutional providers and individual borrowers to search its holdings and order recorded texts via the Internet. Also in 1993, a coordinated pilot project was begun to allow a limited test group of institutional sites and individuals the ability to use the catalog ordering mechanism in an effort to gather structured feedback on the usefulness of the system and suggestions for improvements. Although the project cannot be considered an overwhelming success, much insight has been gained as a result of our efforts and will be of considerable value in the development of a future improved version of RFB&D's online public access catalog.

RFB&D SERVICES

Recording for the Blind and Dyslexic is a not-for-profit service organization that provides educational and professional books in accessible media formats to people with print disabilities including blindness, low vision, mobility impairments, and perceptual learning disabilities such as dyslexia. RFB&D primarily provides texts in four-track audio cassette format, but also has an ever growing electronic text program which can supply a limited number of texts on computer diskettes. Works available in E-text format are usually books that have little value in audio form, such as dictionaries, reference works, and computer software manuals. All audio recordings are loaned to borrowers free of charge, while E-text books are sold to users for a nominal charge.

Most of the work needed to produce RFB&D's texts is supplied by trained volunteers who record books or do E-text editing at 30 different studios scattered across the United States. In 1994, over 4,400 volunteers contributed some 324,000 hours worth of volunteer services. The combination of a largely volunteer workforce and generous corporate and individual contributors explains how RFB&D was able to provide most of its services to 36,000 active borrowers free of charge.

BIBLIOGRAPHIC INFORMATION

Prior to 1991, the only publicly-available reference tool for finding recorded books in RFB&D's master tape library general public was a printed catalog. These printed catalogs could be purchased by schools, outside agencies, and private individuals, but naturally were of little help to most of our borrowers. Beginning in 1991, RFB&D began to produce a subscription service on audio cassette called the Quarterly Recorded Catalog, which offered information on the latest recorded and electronic texts in a non-print format for the first time. In the following year, RFB&D began to offer its Quarterly Recorded Catalog on computer diskette as well. RFB&D's holdings can now as well be found by using the National Library Service CD-ROM catalog at regional and branch NLS libraries.

Recording for the Blind and Dyslexic began cataloging their holdings on OCLC beginning in 1980, and have been using the current in-house database system called MINISIS since 1985. However, public access to RFB&D's bibliographic information by consumers via online environments became available only in this decade. Individual computer users can now access bibliographic databases containing information on RFB&D's holdings by three major routes:

(1) a paid subscription dial-up service provided by the American Printing House for the Blind called _CARL et al_;

(2) the Library of Congress online catalog known as LOCIS which contains the braille and audio publications listed through the NLS, now available on Internet at the LOCIS.LOC.GOV site, and;

(3) RFB&D's own Internet catalog at the WAIS.JVNC.NET site at port 4445.

NEEDS ASSESSMENT

In light of the fact that RFB&D's borrowers now have a number of avenues through which they may access our bibliographic information, one may question the need to design and maintain a catalog which is solely designed for user access. Although there may be several legitimate reasons for any library to produce and control its own public access catalog, the primary impetus behind the development of RFB&D's Internet catalog was to support an automated online ordering process. A second consideration was the need to create a user friendly interface for those not familiar with bibliographic search methods. Both of these concerns were supposed to be addressed in the Internet database.

Prior to the Internet system's start-up, orders were generally phoned in via a toll free service to RFB&D's Princeton, New Jersey Headquarters, or were printed out and sent by mail or FAX. The Internet catalog's ordering function was designed to provide more effective service in this regard, because borrowers would be able to search our catalog and order materials during the same session without having to make a phone call or printing out information. Additional benefits would include: no busy signals or being placed on hold while waiting for your call to be answered; borrowers on the West Coast or living in England or Australia would not have to worry about changes in time zones; users outside the U.S. who are not able to use the toll-free service would not have to make a long distance phone call, and; an automated ordering system would relieve some of the very heavy traffic now routed through RFB&D's phone system. Clearly, an integrated automatic ordering system connected to an Internet accessible catalog would go a long way toward the important goals of independent user access, quicker processing of consumer book orders, and less need for human intervention resulting in lower service costs and a more efficient use of limited resources.

SYSTEM DESIGN AND IMPLEMENTATION

In 1992, RFB&D hired the Princeton based Internet provider Global Enterprise Services (formerly JvNC) to design and start-up a library based catalog system. The principal designer of the system was Vikas Aggarwal, with additional assistance provided by David Wagner and Spencer Sun. The catalog system was designed as a Wide Area Information Server, or WAIS database, allowing full- text searching and operating under a client-server model using the Z39.50 protocol as an ANSI standard. The system was set up on a Sun Sparcstation-2 running SunOS (Sun's Operating System), with 64MB of RAM, 1GB of disk space, and having a 40-Mhz SPARC CPU rated at 28.5MIPS. The following specifications were used to guide system design:

1. The catalog system should be available and searchable on the Internet;

2. The user interface should support ASCII terminal types as opposed to bitmapped type graphic terminals;

3. The searching capabilities would feature form based user input, an "expert" command-line type of searching capability for more experienced users, and field based searching capability;

4. Responses to the query should be displayed in user selectable brief or full format;

5. An order form for electronically ordering a text would be available as part of the system.

The system was developed as specified, and was connected to the Internet via ethernet connection at WAIS.JVNC.NET port 4445, and was also made available through the WAIS.JVNC.NET gopher site

under the Publishers Online directory.

Because the system design was a WAIS database, it did not have the inherent ability to perform Boolean searches or allow for truncation, unlike most library catalogs. Instead, the WAIS system is designed to search the database using an automatic word weighting algorithm with more specific or rare terms assigned a higher value. The search is done by finding the bibliographic records with the most word weights for each word in the query. The record has its score increased each time it contains a word in the query. The record best matching the search is given a score of 1000 with others getting proportionately lower scores. GES did attempt to introduce an updated WAIS version earlier this year that would have allowed Boolean searching, but other problems related to a new word weighting algorithm produced unpredicted errors and the earlier non-Boolean design had to be kept.

Although the typical WAIS system is based on full-text searching only, GES modified the WAIS software to allow for field based searching like most library catalog systems which allow for subject, author, and title searches.

BENEFITS OF THE GES CATALOG

One of the nice features of the GES design is that the form based field searching capability allows users who have no prior experience with online catalog systems to immediately begin making searches without having to spend time learning how to construct search statements. Once logged on to the system, the user gets a screen like this:

```
 [Search]                          [Help]                    [Quit]
   Command-Line
    Full-Search
RFB Book Number
         Status
         Author
          Title
        Edition
      Publisher
           Date
           ISBN
          Level
          Dewey
        Subject
  General Notes
            ISN
```

With this kind of arrangement, all a novice user has to do is move the curser to the author, title, or subject field, type in some information, and then move the curser to the button and press enter. This is far more intuitive that highly structured catalogs like LOCIS where you will get no hits with a subject search like "find art history" just because you failed to enter it as "find art--history." Other benefits of this kind of search screen are the "full-search" field that will look for any term or group of terms throughout the entire bibliographic record, and the automatic scrolling "command-line" field that permits the user to enter the entire search statement on one line without having to move the curser to different fields. The user does not have to read through a manual to figure out basic search construction, nor does one have to memorize specialized searching codes or language syntax to find books.

Another benefit of the WAIS based weighting system is that a user retrieves a number of related texts in addition to the specific title or exact subject area entered. This allows the user to browse through a much larger list of items than that which would be retrieved on a typical Boolean based system, while at the same time having the items that specifically match the search at the top of the list. This kind of approach means that even a poorly constructed search will almost always come up with something relevant. The user can be fairly confident about finding the majority of texts on a given topic without having to reconstruct a search in different ways.

Of course, the major benefit of the GES catalog is the ordering function, which allows users to order

books which they have selected by simply typing "O" while viewing the bibliographic record. This presents an order form upon which users enter their mailing information and borrower ID number. After completion of the form, the order is sent to RFB&D for processing. {Currently, the order function is reserved for members of the pilot test group who have been issued a password to call up the order form.}

PILOT FEEDBACK AND SYSTEM DRAWBACKS

Although the system came online in late 1992, it was considered a rough test version, and no announcement was made regarding its development. After a year of initial testing, a number of institutional users (mostly disabled student services offices on college campuses) were asked to be part of the initial test group using the catalog. Several blind and low vision users were also added to the group, and the official coordinated pilot testing began in early 1994.

In general, pilot feedback has been positive. There are, however, a number of nagging problems about the system that seem to be almost universal. Despite the previously mentioned benefits of the WAIS based system, many users who have already become accustomed to online catalog systems using Boolean searching methods find the WAIS word weighted searching method very confusing. Especially exasperating to many seasoned online catalog users is the fact that the more terms you enter, the broader the search becomes--the exact opposite of a Boolean system. And to top that, the system almost always retrieves more that 100 hits and then tells the user "please refine search," when in actuality there is no way to do this. Obviously this would aggravate any new user.

Another low point of the system is that it has next to nothing in the way of help screens. There are only two help screens to be exact, and they give only general help on keystroke and control sequence commands and the very basics of searching.

A few users have experienced problems with terminal emulation, but this is almost always remedied by using alternate control sequence patterns, such as using control-p to move your curser up one line if the up arrow does not work. The major problem with terminal emulation is that the system does not accept IBM3270 terminal emulation, so colleges that have only IBM mainframe connections cannot access the catalog.

The most serious drawbacks to the current system are not quite so apparent to the casual users, but are placing major stumbling blocks in front of any further improvements of the GES catalog. The root of many system problems is based in the inability of GES to maintain or update the catalog due to loss of key personnel that designed the original system. Even updating the database to include newly recorded texts--what should be a simple and regular procedure for any online catalog--is possible only with great effort. Additionally, although the WAIS database does generate an electronic order as a function of the catalog, the GES system was never able to be integrated into RFB&D's production system, and so does not meet one of the original criteria for development of the system. Currently, the electronic orders are sent to a mailbox at Princeton, and must be manually keyed into RFB&D's automated production system. It now appears that these kinds of basic design flaws cannot be corrected in the GES database, and that a new system will have to be designed. In the meantime, Recording for the Blind and Dyslexic will keep the present Internet catalog operational while it develops a new online catalog. Information gathered from this pilot program will be of great assistance in designing a new bibliographic database, and will help to insure that a vastly superior system becomes available in the near future.

DESIGNING A NEW ONLINE CATALOG

A number of important design features will be need to be considered in the future bibliographic system developed by Recording for the Blind and Dyslexic. Some of these are paramount to the creation of a truly effective and efficient system. Others may not be quite so important to the basic function of the catalog, but are valid concerns for constructing a user friendly database. Here are some considerations for the next catalog:

1. An accessible system on the Internet.

RFB&D remains committed to the concept of a user friendly system that works well with adaptive technology, is easily reachable via the Internet, and allows users to place orders while logged into the system. The catalog will most likely be accessible through a telnet connection, but an HTML based form for searching and ordering on the World Wide Web is also being considered;

2. A fully integrated system.

A vital consideration of a new design is that it must be integrated into RFB&D's automated production system. The ideal system will verify that individuals are registered borrowers before allowing them to place orders, and will automatically enter the order information into the production system without having to involve human operators. This will speed up delivery of texts, and free up expensive human time for other applications. Such an integrated system would also allow individuals to search for and order e-text materials and audio equipment using credit card numbers providing a secure system is generated. Additionally, an integrated system would allow users to mail comments and suggestions to RFB&D while using the catalog;

3. A bibliographic system.

Consumers like knowing as much information about books as possible before ordering them. This saves the user considerable time by being able to choose the most valuable books without having to spend many hours listening to the recorded text first. A system that merely gives the user a title, author, and a few subject headings is not really an acceptable alternative for that reason. A system that has the capacity to include summaries or abstracts is ideal;

4. A system owned and operated by RFB&D.

Many of the problems cited above with the current catalog could have been fixed if RFB&D had been able to control and maintain its own system. It is therefore imperative that any new system that is developed for RFB&D's users should be under the full control of its own personnel. This would expedite any revisions to the system and allow for regular updating of the bibliographic information;

5. System feedback to users.

One flaw of the current system is that consumers do not receive much in the way of system feedback to assure them that their order is being processed. A full service automated system would be able to verify ordering information for each user on an individual basis. An ideal system would allow borrowers to pull up their own personal account to see what texts they have ordered, and what texts they already have out;

6. User help and documentation.

For a system to be truly user friendly, it must be equipped with a good online help facility, with specific informative help screens for each operation explaining all commands and search constructions. Some form of retrievable documentation should also be made available at the host site. Additionally, a taped tutorial would be of great benefit to many users;

7. Saving results of database searches.

Many users prefer to download long lists of works on a related subject for later use. This allows them to sort through lengthy lists with a word processing program and saves considerable time in putting together a select list of valuable books to order. For this reason, a system that sends search results to users as e-mail, or allows them to retrieve it like a gopher or ftp text, is very useful;

8. The ability to narrow searches.

Although some users have grown to prefer WAIS based searching, most individuals would prefer some means of initiating a Boolean search which would limit items retrieved to a smaller number. Boolean

searching will be a certain feature of the new system.

CONCLUSIONS

Despite the failure of RFB&D's current online Internet database to meet the needs of the organization and its users, the pilot program has been an important experiment, nonetheless. Much insight and valuable experience has been gained. Although the new system being developed may not be able to fully integrate all of the design considerations just mentioned, Recording for the Blind and Dyslexic plans to include as many of them as feasible. Current time tables are very tentative, but call for introduction of the new system during the 1997-98 fiscal year. In the interim, all interested parties are urged to continue using the old catalog if you find it useful. RFB&D welcomes any additional input you may have, so please let us know what features you believe are important to have incorporated into our future system.

Return to itdv02n4 Contents Page

Return to Journal Volumes Page

(c 1994 Tom McNulty)

*INTRODUCING _INFORMATION TECHNOLOGY AND DISABILITIES_*

Tom McNulty
mcnulty@acfcluster.nyu.edu
Editor-in-Chief
*_Information Technology and Disabilities_*

INTRODUCTION

Late last summer, several members of EASI (Equal Access to Software and Information), began discussing the possibility of creating an electronic journal devoted to applications of information technology by individuals with disabilities. EASI already had a number of information-disseminating activities underway, including two electronic discussion lists and a directory on the St. John's University gopher (see Zenhausern and Holtzman's article, this issue, _ITD_). In addition, EASI has a regular column in _Library Hi Tech Newsletter_, published by Pierian Press. With general guidance from Norman Coombs, EASI Chair, and technical support from Dick Banks, adaptive technologist at the University of Wisconsin, Stout, and Dr. Bob Zenhausern, professor of psychology at St. John's University, a core group of EASI members began "meeting" on a private listserv established to coordinate all aspects of this fledgling journal.

The first order of business was to select an editorial board, composed of experts in education, librarianship, campus computing, as well as rehabilitation and job accommodations for individuals with disabilities. Assembling the editorial board was easy enough; virtually everyone asked to participate accepted the invitation. Once the private listserv, EASIPUB, became operational, members of the editorial board were able to work out details through meetings held via e-mail. In this article, I will describe the goals of _Information Technology and Disabilities_, at various points asking for your participation and input for future issues; if _ITD_ is to achieve its goals, we need your help in the form of news items, notices of meetings and new or forthcoming publications, research-based and case study articles, as well as ideas for articles or theme-based issues.

The first issues addressed by the editorial board included title, frequency of publication, intended audience and scope of coverage. After considerable debate over several alternatives, _Information Technology and Disabilities_ was chosen as the title and work began on designing this international, multidisciplinary electronic journal. It was decided early on that the journal would appear quarterly, and that our target audience would include users of adaptive technology as well as the many service professionals who are interested in applying new and emerging technologies in their various fields; the latter group includes librarians, educators at all levels, rehabilitation professionals, campus computing and disabled students' service personnel, and others who wish to realize the potential of information sources and technologies by individuals with disabilities.

SCOPE OF COVERAGE

Each of the groups mentioned above, from librarians to academic computing staff, has at its disposal a number of professional journals providing timely information on a wide variety of topics in their field(s) of coverage. Scattered throughout this body of literature are the few items of interest to people who need to know what's happening in the world of adaptive technology, accessible information and other vital news of increasing importance to individuals with disabilities. _Information Technology and Disabilities_

intends to address issues relating to information technology in its broadest sense. While our focus is largely upon practical uses of technology by individuals with disabilities, _Information Technology and Disabilities_ will, in future issues, hopefully include historical, sociological, and legal analysis and commentary.

One of the issues we encountered early on, and which at this writing is still an issue on the editorial board's agenda, is the technical knowledge level we should expect the majority of our readers to have. While it is expected that most will have basic computer literacy, we do not expect that the majority have anywhere near the technical expertise of, say, a professional computer programmer. In response to our first call for articles, we received one highly technical paper which describes in detail a computer scientist's work in the area of access to machine- readable documents. That article is being revised, and has not gone through the process of review. The editorial board is leaning toward including such material in _Information Technology and Disabilities_. We are working with authors to make their work as accessible as possible, but there will be articles in _ITD_ which will be comprehensible only to a limited audience.

While some articles may be extremely technical, others will appeal largely to the novice. We will attempt to provide overviews of specific technologies, written in plain language and intended as information pieces for those whose experience is minimal. For example, "What is a TDD and How Does it Work?" might cover the history of telecommunications for the hearing impaired, describe the current state of the technology, and discuss ADA requirements. Whether highly technical, very basic, or somewhere in between, each of the feature articles in _Information Technology and Disabilities_ will be annotated in the Table of Contents, alerting readers to the article's level of technical sophistication.

DEPARTMENTS

In addition to articles, _Information Technology and Disabilities_ will have a number of regular "departments." These sections will present major news of interest, including notices of new discussion groups, publications, conferences, seminars, and more. Editors of these sections are identified in the table of contents; please keep them informed of news as you hear it (or as you make it!).

Anyone who subscribes to one or more listservs is aware of the meaning of the expression "information overload;" with each quarterly issue, it is our intention to present the MAJOR news of national importance. Think of _ITD_ as a quarterly, selective listing of news obtained from listservs, professional associations, and just as important if not more so, from _ITD_ readers themselves.

In closing, I would just like to say that _Information Technology and Disabilities_ will only be as good as the articles submitted to it for publication. Please, if you have work in progress, or if you're willing and able to do an article on a topic suggested by the editors, contact me, preferably via e- mail.

Tom McNulty
Editor, _ITD_
mcnulty@acfcluster.nyu.edu
Bobst Library
70 Washington Square South
New York, NY 10012
phone: 212/998-2519
TDD: 212/998-4980

Return to itdv01n1 Contents Page